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INTERNATIONAL INSTITUTE OF AGRICULTURE

BULLETIN OF THE BUREAU OF AGRICULTURAL INTELLIGENCE AND OF PLANT-DISEASES

2nd YEAR - NUMBER 7

JULY 1911

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ROME, 1911 — PRINTED AT THE INSTITUTE'S PRINTING OFFICE

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ABSTRACTORS.

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Dr. THÉODORE BIÉLER
Dr. GUIDO BORGHESANI
G. DE BRANCION, Agric. Engineer
Dr. VITALE DE TIVOLI
Dr. LEO GABRICI
JULES JOBERT, Agric. Engineer
Dr. GIUSEPPE LAZZARINI
Dr. FRANCESCA PIRAZZOL
Dr. GIULIO PROVENZAL
Dr. GIULIO TRINCHIERI

CHRISTOPHER J. ALEXANDER, B. Sc. (Agric.).

TRANSLATORS.

Mrs. OLIVIA AGRESTI-ROSSETTI, Miss FLORENCE M. MAC IVER and Dr. A. BRODRICK-BULLOCK are provisionally attached to the Bureau as English translators.

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The Canadian abstracting is by Mr. J. K. Doherty, the able chief of the Canadian Bureau of Correspondence with the International Institute of Agriculture.

AGRICULTURAL INTELLIGENCE

NB. The Intelligence contained in the present Bulletin has been taken exclusively from the books, periodicals, bulletins, and other publications which have reached the Library of the International Institute of Agriculture in Rome during the month of July 1911.

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The Editor's notes are marked (Ed.).

Development of Agriculture in Different Countries — Scientific Institutions — Education in Agriculture and Forestry — Experimentation — Biography — History of Agriculture.

W. Stoykowitch and Savic. **Development of Agriculture in Servia.** 2081
(Développement de l'Agriculture en Serbie). — *La Serbie à l'Exposition Universelle de* 1911 *à Turin.* Publication du Ministère de l'Agriculture, du Commerce et de l'Industrie, V - VI - IX, pp. 64, 102, 136, 147. Belgrade, 1911.

About 73 % of the total area of Servia consists of productive land, the rest being waste. Half of the productive area is under the plough, the other half being woods and grazing lands. There are no large land-owners in Servia. The soil belongs to those who till it. Servia

Agriculture progresses slowly but steadily. The cultivation of the soil is constantly improving, perfected implements are more and more used, the area under cultivation grows from year to year. This is shown by the increased production, which allows of an ever-growing exportation.

The following are the average figures for exports (in *dinars:* 25.25 *dinars* = £ 1); 1 dinar = 1 franc.

1881-1890	39 895 198
1891-1895	47 411 123
1896-1900	59 716 755
1901-1905	66 117 861
1906-1909	80 956 548

Cereals, vegetables, hemp, flax, tobacco, beetroots, potatoes, etc., are raised. The pasture lands are almost exclusively natural.

The following table shows the value of the exports of each product in 1909 :

Maize	dinars	12 647 102
Wheat	»	29 180 490
Rye	»	991 490
Barley	»	7 501 285
Oats	»	926 663
Haricot beans	»	615 026
Fresh fruit	»	2 127 116
Flour	»	1 277 033
Bran	»	788 065
Plum jam	»	460 884
Dried prunes	»	2 168 869

Tobacco is purchased for the Government Monopoly. The beet-crop suffices to keep a subsidised factory going. The soil and climate are admirably suited to vines. For the control of phylloxera nurseries have been been opened for the cultivation of American vines at Smederevo, Doukouvo, Toptchider, Nisch, Alexandrowatz and Jagodina. The Minister of Agriculture assists the communes, districts, or agricultural societies desirous of forming vine nurseries, with vines free of charge, money and technical advice. Yet, in spite of all these encouragements, the restocking of Servian vineyards proceeds slowly, though constantly progressing.

Fruit cultivation and the fruit industry are an important source of national wealth in Servia. Western and Central Servia are the fruit growing sections.

The law of 1898 requires each district to possess and support a nursery of fruit trees at least 5 hectares (12 ½ acres) in extent. There are about 60 such nurseries in Servia.

Plum-trees cover a much larger area than any other fruit tree. In 1908, 147 474 ha. (365 000 ac.) were under plums, producing 5 300 618 quintals (c. 521 700 tons) of fruit. A relatively small portion of these plums are exported in their natural condition, the majority being made into jam (*pekmès*) ; some are distilled for *rakia* and *sliwowitz*. The " pojegatcha " is the finest variety of plum.

In good years the exports of plum jam and dried prunes are worth about 16 000 000 frs. (£649 000).

Apples, pears and walnuts are also exported.

Each year Servia produces more and more silk cocoons. The output of fresh cocoons may now be reckoned at over 400 000 kgs. (394 tons). Italy is the largest purchaser of Servian cocoons. The « Sericulture Company » has taken the initiative in the development

of sericulture. It is subsidised by the Government. In 1909, 34 150 families were engaged in breeding silk-worms, as against 10 102 in 1900. The weighing, payment and sorting of the product is done under Government supervision and with the greatest care by this Company.

The fruit-tree nurseries had distributed gratis, by the end of 1906, about 300 000 young mulberry saplings, and there are 600 000 more ready for distribution.

2032

M. N. Lukicevic, M. S. Vasic, M. Petrovic. **Live-Stock, Forests, Game, and Fisheries in Servia.** (L'élevage, les forêts, la châsse, et la pêche en Serbie). — *La Serbie à l'Exposition Universelle de 1911 à Turin*, Publication du Ministère de l'Agric. Ind. et Com. VII - VIII - XIII, pp. 102-135, 182-198. Belgrade, 1911.

Servia

Stock-breeding is the most important branch of the economic life of Servia. Live-stock, more especially oxen, are exported to Italy and Egypt, via Salonica, in which sea-port the Servian Government has built large cattle sheds. Native breeds of cattle have been notably improved by the enforcement of a law on the development of live-stock breeding, the opening of a Government breeding stud and a training School for live-stock breeding and mountain cultivation, by the appointment of a Permanent Commission for Cattle connected with the Ministry of Agriculture, and by the reform of the veterinary laws and the improvement of the veterinary service.

Horses, oxen, pigs, sheep and poultry are extensively raised. The native breed of cattle is descended from the Podolian breed ; its best representatives now are the oxen of Kolubara, Maljen, Jasenica and Resava.

The oxen are small and grow slowly, but their meat is excellent. Specimens of the Marianof, Mürzthal, Pinzgau, Montafon and Simmenthal breeds have been purchased for crossing. Thoroughbred Simmenthal cattle are raised in the Government breeding station at Dobricevo, and at the Agricultural Schools of Sabac, Topcider and Kraljevo.

35 229 oxen were exported in 1909. The value of the fresh meat exports amounted to 2 219 908 frs. (nearly £88 000).

Servia does not export horses. A Government breeding-stud has been opened at Dobricevo with some 450 horses. The native breed of horses belongs to the Turco-oriental breeds, and is excellent for crossing with thoroughbred English and Arab horses.

The dairy industry is but little developed in Servia, where cattle are raised more especially for slaughtering. At the Government Institute at Dobricevo soft « Imperial » cheese and hard « Trap-

pist » cheeses are made, and « *Kackavalj* », a native cheese. The number of sheep (3 160 166) and goats (510 063) is considerable and their milk supplies the needs of the dairy industry.

109 894 sheep were exported in 1909. The Government has introduced Ost-Frieslands and Hampshires for crossing.

Servia is famous for its pigs. There are three native breeds : « *Sumadija* » from which the « *Mangulica* » is obtained, « *Macva* » and the Black Moravian breed. Yorkshire pigs are bred in the Government farms. The Black Moravian breed is the result of crossing the black English pig with the *Sumadija* and *Macva* breeds. In 1909, 20 262 pigs were exported, besides bacon, ham and salted pork.

The Government has opened several model poultry yards to improve the breed of poultry. In 1909, Servia exported:

Live poultry	436 235	birds
Dead »	90 700	kgs.
Eggs	1 888 368	»
Feathers	55 608	frs. (£22 000) worth.

The Government has also opened several model bee-farms.

The great rivers, the Danube, the Sava the Drina, etc., confer real economic importance on the fisheries of Servia. Only costly fish such as Sturgeons (*Acipenser*) are exported; 110 758 kgs. (about 109 tons) of this fish were exported in 1907.

In spite of the favourable natural conditions, pisciculture had not yet been practised in Servia.

The following data are given for Servian forests :

Belonging to the State	550 000 ha.	1 360 000 acres
» » » Communes	650 000 »	1 610 000 »
» » monasteries and churches	17 000 »	42 000 »
» » private persons	300 000 »	743 000 »

Almost all the trees and shrubs of Central Europe are found in the Servian forests. The beech is the most wide-spread of the deciduous trees, and after it the oak; of coniferous trees the fir is the most common. The largest forest in the West of Servia is that of « Tara », which covers an area of 25 000 ha. (62 000 ac.). Forests are not intensively exploited.

About 120 000 cu. m. (4 240 000 cu. ft.) of beech timber are felled in the State forests, 10 000 cu. m. (353 000 cu. ft.) of oak, and 60 000 cu. m. (212 000 cu. ft.) of resinous wood. At present there are only 11 large and well-organized saw-mills. In 1909, Servia exported :

Fuel wood	29 134	cu. m.	1 028 925 cu. ft.
Unsawn timber	2 752	»	104 262 cu. ft.
Sawn timber	13 827 190	kgs.	13 609 tons.

Though game of all sorts is abundant in Servia, hunting and shooting are little practised, and table game is not abundant enough to be valuable. A law regulating hunting and shooting in accordance with modern standards was only passed in 1908.

The Improvement of the System of Cultivation in Roumania 2033
(Amélioration du système de culture en Roumanie). — *Bulletin de l'Office des Renseignements Agricoles*, X. An., No. 5, pp. 597-603. Paris, Mai 1911.

Roumanian agricultural legislation (Dec. 23, 1907, April 21, 1908, March 27, 1909 and April 15, 1910) aims at forming communal grazing lands and at improving the methods of cultivation of the small farmer. Rumania

In 1909, the Minister of Agriculture distributed gratis 49 000 kgs. (48 tons) of lucerne seed, and in 1910 93 000 kgs. (91 ½ tons). The lucerne fields are doing well and the peasantry are convinced of the great importance of forage crops. The requests made for the current year are numerous.

900 new communal grazing lands have been formed : their number will soon amount to 2000.

Law to promote Agricultural Development in Spain. (Ley disponiendo que el Gobierno redacta un plan de reconstitución agronomica del pais, sobra las bases de la creación de los Centros agricolas de caracter esperimental en aquellos puntos que no existan otros Establecimientos analogos). — *Gaceta de Madrid*, Año CCL, Tomo III, N. 182, pp. 4-5. Madrid, 1º Julo 1911. 2034

The following are some of the more important provisions of this law:

The Government shall prepare a project for agricultural improvement, based on the opening of new agricultural experiment stations, utilising for this purpose the provincial agricultural laboratories. Spain

This project shall be drawn up by the General Direction of Agriculture, Mines and Forests (*Direccion General de Agricultura, Minas y Montes*), after consulting the Superior Board of Agriculture (*Junta Superior Agronomica*), and shall be submitted by the Minister of Agriculture, Commerce and Public Works (*Ministro de Fomento*) for the approval of the Council of Ministers.

The Minister of Agriculture is authorised to carry out the work for the organization of practical regional Training-School Farms

(*Granjas Escuelas practicas de Agricultura*) and of special institutes; providing for the organization of an agricultural statistical service and improving the travelling professorships of agriculture.

The Minister of Agriculture is also authorised to erect buildings for the College of Agricultural Engineers (*Escuela de Ingenieros agronomos*).

2035 BOYLE (brit. cons.). **Agriculture in Madeira**. — *Diplomatic and Consular Reports*, No. 4705, pp. 1-13. London, June 1911.

Madeira

The general condition of Madeira is favourable to the growth of tobacco ; and some of the specimens of leaf grown here from American seed, supplied direct from the United States Department of Agriculture, and from other tobacco growing countries, were most favourably reported on by experts.

In 1910, some 35 000 to 36 000 tons of cane were used for sugar, as compared with 33 000 tons in 1909.

Madeiran cane growers are yearly becoming more alive to the advantages of chemical manures, and an ever increasing quantity is being demanded.

The wine shipping industry has been through a somewhat trying year. The new treaty between Portugal and Germany has not, up to the present, been prolific of anything but difficulties for the shippers. Under the new wine law all growers are bound to declare their full production, whether sold to shippers, to *partidietas* (small merchants), to local dealers, or kept for their own use, before November 15.

The exports in 1910 were as follows :

Wines	Pipes	—	7 225 (1)
Potatoes	Tons	—	111
Fruit	»	—	57
Onions	»	—	228
Butter	Kilos	—	18 668 (41 070 lbs.)
Eggs.	Number	—	589 090

The destination is for wines, Northern Europe, United States and Brazil; for potatoes, West Indies; for fruit, Portugal and United Kingdom; for onions, West Indies; for butter, Portugal; and for eggs, South Africa.

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(1) A "Pipe" of Madeira = 92 gallons. (*Ed.*).

BILISKY & KRAUS. (Austrian Consuls at Janina and Valona). — **Agriculture at Janina and Valona** (Europa-Türkei-Valona, Europa-Türkei-Janina). — *Berichte der k. und k. Oesterr. - Ung. Konsularämter.* Jahrgang 1911, pp. 1-21, 1-15. Wien, Juli 1911. 2036

In 1910, the area and production of the crops was distributed as follows in the vilayet of Janina in South Albania : Turky-in-Europe: Janina, Berat

	hectares	hectolitres	acres	bush.
Wheat	18 000	200 000	45 000	555 000
Rye	6 000	75 000	15 000	208 000
Barley	20 000	290 000	50 000	805 000
Oats	18 000	280 000	45 000	776 000
Maize	52 000	675 000	130 000	1 873 000

The yield was low, so much so that other cereals had to be imported from abroad.

The vilayet exported 199 500 frs. worth of citrons and 3 500 frs. worth of citrate. The value of the exports of the products of the olive trees amounted to 3 917 000 frs. The yield of the vineyards is small and of poor quality, and does not suffice to meet local requirements.

In 1910, the value of the sheep, skins, wool and cheese exports amounted to 4 699 000 frs.

In the Sanjak of Berat, which corresponds to the Austrian Consular district of Vallona, the progress of agriculture has not been encouraging. This is mainly due to the constant emigration of the rural population. Nevertheless, in 1910, the barley raised sufficed for local needs, and maize was exported. On the other hand, wheat and oats were imported. The vineyards are devastated by *Peronospora.* The output of olive oil averages 30 000 quintals (3000 tons). Instead of progress being made in live-stock breeding the exportation of cattle to Italy is declining. In 1910, Vallona exported :

Cereals	15 073 quintals	1483	tons
Eggs, fish, etc.	224 »	434	cwts.
Live-stock and animal products	3 194 »	314	tons
Live-stock	4 000 head		
Olives, oil, etc	82 286 quintals	8098.5	tons

J. PINTER (Austrian Consul at Beirût). **Agriculture in the Vilayet of Beirût.** (Asien, Turkei, Beirut). — *Berichte der k. und k. Oester. Ung. Konsularämter,* pp. 1-29. Wien, August 1911. 2037

Wheat continues to be the most important crop raised in Syria, followed by barley, of which over 100 000 tons were exported to Great Britain in 1910. The supply of maize is inadequate for local needs. Turkey-in-Asia : Syria

300 tons of lentils, 600 of green-peas, and 1 000 of beans were exported to Egypt : 5 000 sacks of these beans were sent from Tripoli to England. Excellent citrus fruit is grown in Tripoli, of which 300 000 boxes were exported in 1910. The exports of apricots are declining. The raisins and walnuts of Damascus are excellent. A fairly large quantity of pistacchio nuts are also exported. Saida is the centre for the production and exportation of dried figs. About 3300 tons of sesame were exported in 1910. A busy trade is still done in olive-oil.

The tobacco crop is of capital importance to the agriculture of the vilayet and to that of Syria in general. From 150 000 to 160 000 kgs. of Djebeili tobacco are raised each year in the district of Khoura in the vilayet of Lebanon. The Abu-Riha variety is raised more especially at Latakia, where some 100 000 kgs. are annually harvested, almost all of which is exported to England. This tobacco is highly perfumed. Of the unperfumed varieties of tobacco, those of Scheck-el-Bent and Djebel-el-Rihau are grown, and some 500 000 kgs. are harvested.

Syria produces about 4 300 000 kgs. of silk cocoons a year. Damascus produces about 50 000 sheep-skins; Beirût exports some 3 000 tons of wool ; and Saïda and Haïfa ship over one million eggs.

2038 Stevens (Austrian Consul at Brûssa). **Agriculture in the Sanjak of Brûssa.** (Asien, Turkei, Brussa). — *Berichte der k. und k. Oesterr.-Ung. Konsularämter*, pp. 1-11. Wien, Juli 1911.

Turkey-in-Asia: Brûssa

For the first time in 1910 the harvest was a failure in the Sanjak of Brûssa, owing to the scarcity of labour. This shows the need of introducing machinery, especially reapers and threshers.

Experiments have been made with a view to introducing the cultivation of the sugar-beet, for which purpose beet-seed has been distributed to the farmers and the agricultural schools.

Wheat, rye, oats, barley, haricot-beans and maize are raised.

The olive-fly has caused serious loss.

In 1910, 437 500 kgs. (430 tons) of dry tobacco were grown in the Sanjak. Rice is a crop which is gaining in importance, as the soil is admirably suited to it.

The production of eggs is also increasing. Care is taken to select and cross the native breeds of poultry. The eggs are shipped to Marseilles.

There is no improvement in cattle-breeding, although cattle are plentiful in the Brûssa district.

The Dutch Colonies in 1910. Report of the Austrian Consul at Amsterdam (Die Holländischen Kolonien im Jahre 1910). — *Das Handelsmuseum*, No. 26, pp. 403-404. Wien, 29. Juni 1911. 2039

Generally speaking, great agricultural progress was made in the Dutch colonies in 1910, especially in the rubber output.

Dutch Colonies: Sumatra, Java, Sunda Is., Curaçao

Less coffee is raised now than formerly in Eastern Sumatra, as coffee plantations are making way more and more for rubber plantations. No less than 250 000 000 frcs. are invested in rubber plantations in the Sunda Is. The sugar industry is increasingly prosperous in Java. *Liberia* Coffee is subject to leaf-disease in Java but *Robusta* flourishes. The rubber plantations begin to yield a profit.

108 695 tons of copra were exported in 1910 as against 72 000 in 1909.

The Dutch West Indies are also more prosperous. The production of sugar has risen to 12 055 tons, that of bananas to 652 193 bunches, shipped in part to Holland and the remainder to the United States. In one year, one million rubber trees have been planted.

Curaçao is also very prosperous and enterprising. (1)

U. Sanguinetti. **Agriculture in German New Guinea and the Bismarck Archipelago.** (L'Agricoltura nella Oceania tedesca). — *Bollettino della Società Geografica Italiana*, S. IV, Vol. XII, No. 7, pp. 884-892. Rome, 1° Luglio 1911. 2040

The natives of German New Guinea and the Bismarck Archipelago cultivate bananas, vegetables, and cocoanut palms. Their chief export is copra.

German New Guinea, Bismarck Archipelago

The Government makes permanent grants of land to Europeans, on condition that farming operations be begun within two years, and that by the end of another 15 years three quarters of the land granted be under cultivation.

Land can be leased on very advantageous terms.

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(1) In 1908, the agricultural production of the Dutch West Indies and Surinam was: sugar, 11 999 241 kgs.; cacao, 1 409 761 kgs.; bananas 447 585 bunches; coffee 502 900 kgs.; rum, 936 769 litres, and molasses, 145 954 litres. The chief products of Curaçao and its islands are maize, beans, pulse, cattle, salt, and phosphate of lime. The value of the exports from Curaçao and its dependencies, in 1908, amounted to 1 749 708 frs. *The Statesman's Year-Book 1911*, pp. 1056-1057. (*Ed.*).

In 1910, 21 000 hectares (52 000 ac.) were already under cocoanut palms, 2 600 ha (6 400 ac.) under *Ficus elastica*; and over 1 000 ha. (2 500 ac.) under cacao-trees, sisal grass, and coffee.

The plantations are rapidly extending. The cocoanut is the favourite crop; and the rubber plant which is most planted now is the *Hevea*. The fertile soil and damp climate favour the rapid growth of the plants, and they are affected by no formidable diseases. The cocoanut plantations alone are somewhat injured by the « Black Beetle » (1).

In 1909, the Colony exported about 13 000 tons of copra, of which 4 000 came from European plantations. (2).

2041 ROWLEY. (Brit. cons.) **The Agriculture and Agricultural Exports of the French Society Islands.** — *Diplomatic and Consular Reports*, No. 4703, pp. 1-19. London, June, 1911.

The principal agricultural exports from the Society Islands, in 1910, will be found in the following table :

Society Islands

Copra	Tons	8 014
Vanilla	»	257
Fungus	»	21
Beeswax	»	2
Cotton	»	78
Oranges	Number	4 240 450
Pineapples	»	5 450
Cocoanuts	»	871 147

For some time past the local Chamber of Commerce, in conjunction with the local government and some of the principal French merchants, had been attempting to improve the value, in the world's market, of Tahitian vanilla. This had become depreciated owing chiefly to carelessness of the buyers who purchase from the natives.

« When one considers that cocoanut plantations are about the only agricultural industries which for a minimum amount of labour

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(1) Elephant Beetle and Black Beetle are names given to *Oryctes Rhinoceros*, a large beetle belonging to the group of the Lamellicornia, which does much injury to the cocoanut plantations of the Far East. Cf. E. PRUDHOMME, *Le Cocotier; culture, industrie, commerce*, p. 43. Paris, 1906. (*Ed.*).

(2) The cultivated area in the Bismarck Archipelago is 13 464 ha. (33 330 ac.). The chief products are copra, cotton, coffee, and rubber. *The Statesman's Year-Book, 1911*, p. 867. (*Ed.*)

and attention yield a maximum amount of profit, it is difficult to understand why the natives do not exert themselves a little more and try to turn their many acres of uncultivated land into profitable plantations. The natives will rarely sell portions of their lands to foreigners, preferring rather that profitable land should remain covered year by year with jungle and bush than that a stranger should own or cultivate it".

2042

King (Brit. Cons. at Pensacola). **Agriculture in Florida, United States.** — *Diplomatic and Consular Reports*, No. 4708, pp. 1-30. London, July, 1911.

A good deal of attention has been given lately to the agricultural of Florida; and interest in the subject has been stimulated by the clearing of the forest lands. The soil of Florida is sandy with a clay subsoil. It is apparently capable of being made very fertile, and fertilisers are procurable at reasonable prices. The large fruit plantations are situated in the south-eastern part of the State; and in the western portion market gardening is the most remunerative form of industry. Vegetables can be easily raised and command good prices; while material help is afforded to farmers by the Government and country authorities in the form of prizes, classes, supply of seeds and supervision by agents. A good deal of productive land is still, however, useless owing to the lack of transportation facilities; and intending settlers should always consult a reliable local firm before purchase: a personal inspection is to be strongly recommended.

United States: Florida

In spite of the prevailing depression in prices, the total production of phosphate, hard rock and pebble in Florida exceeded 2 000 000 tons, which is greater than the output of any previous year.

The increase is due to the growth in the production in the pebble section, as the output of hard rock shows a decided falling-off (1).

2043

Agriculture in Honduras. (A New Chapter in the History of Honduras). — *The Pan-American Union*, pp. 993-1005, Washington, June, 1911.

Comayagua is in the very centre of Honduras, and of the fertile valley, which is 42 miles from north to south and 24 miles from east to west. The elevation of this valley is given as 1900 feet.

Little has been done to make use of its fertility, and only occasionally one sees a cultivated field from the main road. But here again the native method of farming must be taken into consideration;

Honduras

(1) See: Abstr. 776, *Bull.* March 1911; and Abstr. 1345, *Bull.* May 1911. (*Ed.*).

while there are vast tracts of unused land in the lower part, and it seems as if this large stretch were almost uninhabited, the hills show the fields where the native products are raised. With modern methods, productive fields might flourish where now the «carbou», «cornizuela», «biscuite», and other native trees grow wild. It may not be amiss to state that very few dairy products are manufactured in this country, excepting some cheese, which is made in a very crude way.

The principal products are sugar, coffee, corn, beans, sarsaparilla, some rubber, and vanilla beans. Very little attention is paid to cacao, although this could also be raised in large quantities, as well as the indigo plant.

There is a large variety of trees. Medicinal plants abound, among which may be mentioned rhubarb, ipecac, balsam, manzanilla (1), violet herb, canilla and guaco (2).

There is at present a distillery of *guaro*, or native rum, made from sugar cane ; the manufacture of *guaro* is a Government monopoly (3).

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(1) Manzanilla — *Anthemis nobilis*. Cf. DON MIGUEL COLMEIRO, *Diccionario de los diversos nombres* etc. Madrid, 1871. (*Ed.*).

(2) Guaco — *Aristolochia anguicida*. Cf. ibid. (*Ed.*).

(3) In Honduras the chief culture is that of bananas, mostly on the Atlantic coast, where cocoanuts are also grown. Rubber is produced in slowly increasing quantity; coffee is grown, but there is scarcity of labour for the picking of the berries. Sarsaparilla is exported. Other products are maize (for local consumption), tobacco, sugar, oranges, lemons and beans, while indigo, rice and wheat are grown in small quantities. The sugar-planters mostly use their output for manufacturing rum.

Cattle breeding is carried on extensively, and dairy farming on a small scale. Cattle are exported to Cuba. In 1909, there were within the Republic about 466 211 head of cattle, 64 122 horses, 13 434 mules, 145 352 pigs and 24 052 sheep. About 150 400 acres are under pasture.

A concession was granted (1903) for working the mahogany and cedar forests within the republic. There are considerable local industries, such as the plaiting of straw hats.

The chief agricultural exports have the following values:

	1907-08 £	1908-09 £
Bananas	160 106	185 400
Coffee	16 055	11 818
Cocoanuts	15 805	23 085
Cattle	13 549	9 713
Hides	15 118	10 740
Deer skins	3 258	2 933
Mahogany and cedar .	8 972	8 667
Rubber	6 307	7 596
Ebony	4 516	2 698

The Statesman's Year-Book 1911, p. 943. (*Ed.*).

F. R. SHEPHERD. **Agriculture in Anguilla, Leeward Islands.** — *The Agricultural News*, Vol. X, No. 232, p. 101. Barbados, April 1, 1911. **2044**

The cotton crop of 1910 reached about 60 000 lbs. (27240 kg.) of ginned and baled cotton. The whole of the crop is ginned at the Central Cotton Ginnery, which is equipped with a Hornsby oil engine, three gins and a hand baling press. **Leeward Is. Anguilla**

Much improvement has taken place in cotton cultivation during recent years, and ploughs are now being successfully used on the larger growers' estates. The matter of the provision of power for drawing ploughs in Anguilla is of serious moment, as the frequent droughts cause a high mortality among the oxen usually employed for draft. As a consequence, a small « Universal » motor has been imported and it is hoped that it will prove successful for the purpose of hauling ploughs, as well as for other similar work.

Cotton is not the only crop that is raised to a fair extent in Anguilla ; sweet potatoes, pigeon peas (*Cajanus indicus*) and Guinea corn (*Sorghum vulgare*) all find a reasonable place among the products of the island. One of the chief difficulties that are met with, is the provision of pasture ; at present, the stock lives chiefly on « bush » and weeds. It is intended to try to introduce a hardy grass, such as Barbados sour grass (*Andropogon pertusus*), which in the writer's opinion would very likely form a valuable addition to the agricultural assets of the island, if it were protected for a time after its introduction.

Promoting Agriculture and Stock-breeding in Uruguay. (Encouragement à l'agriculture et à l'élevage en Uruguay). — *Feuille d'Informations du Ministère de l'Agriculture*, XVI. An., N. 25, p. 4. 27 Juin, 1911. **2045**

1 080 000 frs. have been set aside for prizes to be awarded to sheep-farmers who have done most to improve their stock. This sum is to be divided as follows : **Uruguay**

5 prizes among owners of not more than 1000 hectares (2 470 acres);

5 for those who own from 1 000 to 2 000 ha ;

5 for those owning from 2 000 to 4 000 ha ;

5 for owners of estates exceeding these limits.

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(1) Anguilla: area 35 square miles (about 81 square kilometres); produce: garden stock, cotton and salt. (*The Statesman's Year-Book 1911.* — p. 268 and 269). (*Ed.*).

There are no forests in Uruguay ; fire-wood is scarce and is generally supplied by the bushes which grow along the river banks ; timber for building purposes is all imported from abroad. Another legislative measure has been framed to remedy this state of things.

All ranch-owners are required to plant 5 trees per hectare, and to place 1 % of their ranches under forage crops. Failure to comply with this law is punished by a fine, equal to one fourth of the land-tax for which the estate is assessed.

A prize competition will be held for tree-planting and for cultivated forage crops (1).

2046 **Sudan Agricultural Exports.** — *Journal of the Royal Society of Arts*, No. 3055, pp. 774-775. London, June 9, 1911.

It is only a very few years since the exports of the Sudan might be roughly summed up as gum, ivory and ostrich feathers. The list of Sudan exports now includes live-stock, hides, skins, rubber, bees' wax, wheat, millet, barley, cotton, cotton-seed, sesame, ground-nuts and dates. Some 80 per cent. of the exports of 1909 were rain and flood products. In view of the development of the food products of the Sudan, it is hoped, before very long, that the country may furnish a very large proportion of the food supply of Egypt, and may also help to solve the labour difficulty by drawing settlers to the Sudan.

Anglo-Egyptian Sudan

The construction of the Blue Nile Railway will bring crops on to the market at the same time as those from the White Nile and Kordofan districts. The railway will be of great service to the cattle-producing areas in the Sudan.

Part of the programme of the Economic Board has been to substitute production in the Sudan for imports from abroad. These articles are wheat, maize, barley, rice, flour, dates, sugar, timber and salt.

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(1) See: Abstract 1348 of the *Bulletin* for May 1911.

In Uruguay, 500 000 ha. are grazing land. The area under the principal crops in 1909 was: Wheat, 276 787 ha.; flax, 18 341; oats, 6 891; barley, 3 487; millet, 141. In 1909, 233 910 tons of wheat were harvested and 169 464 of maize.

In 1908, there were in Uruguay 9 000 000 head of cattle, 1 000 000 horses, 26 000 000 sheep, 60 000 mules, 40 000 goats, and 120 000 pigs. In 1907, Uruguay imported from Europe and the Argentine, for breeding purposes, 540 head of horned cattle, 2 282 sheep, and 181 horses. *The Statesman's Year-Book 1911*, p. 1316. (*Ed.*).

The chief export is gum. The crops of 1909 were the largest recorded and reached 13 282 tons. The new railway between El Obeid and the White Nile will produce a complete change in the conditions of transport. It is likely that the extension of the line along the White Nile will help to develop the gum trade in the districts along the river. Dura (1) is easily grown. Oil seeds form a considerable item of the Sudan exports. The most important of these is sesame. Ground nuts have been cultivated on some estates to the north of Khartoum. Experiments made in the growing of castor seed show that it can be cultivated in certain districts with good results. The Sudan possesses very large supplies of cattle, sheep, and goats, and these should form a large and permanent export to Egypt.

The following table gives the value of the chief Sudan exports for the year 1909, in Egyptian pounds:

(1 EGYPTIAN POUND = 26 FRANCS).

Gum	—	£. E.	371 896
Dura	—	»	136 599
Sesame.	—	»	63 066
Ground Nuts . . .	—	»	3 594
Ginned Cotton . . .	—	»	39 283
Sheep and Goats . .	—	»	39 395
Ivory	—	»	45 056
Dates	—	»	35 306

The Growth of German Colonial Companies in Samoa and Kamerun. 2047

(Erwerbsgesellschaften in deutschen Kolonien). — *Deutsche Kolonialzeitung*, 28 J., Nr. 27, p. 461. Berlin, 8 Juli 1911.

The Kamerun-Kautschuk-Company has enlarged its rubber plantations by 50 % in the last five years. This Company farms 1829 hectares (4518 acres) planted to 1 900 000 rubber trees, and 430 000 cacao trees besides of 14 000 native palms. The cacao tree yields 1 300 kgs. per hectare (10 cwt. per acre). [German Colonies: Kamerun, Samoa Is.

The Safata-Samoa-Gesellschaft owns two large plantations, one at Saningoga, the other at Taunaimato. The first numbers 68 000 cacao trees, 20 000 rubber trees, and 4 300 palm trees. The second numbers 61 000 cacao trees, 31 000 *Hevea*, and some palms and coffee trees.

The Samoa-Kautschuk-Gesellschaft owns 152 000 *Hevea* trees. Both the *Hevea* and the cacao trees flourish in the plantations of this Company.

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(1) Egyptian name of *Andropogon arundinaceus*. A. ENGLER: *Syllabus der Pflanzen Familien*, p. 88. Berlin 1909. (*Ed.*).

2048 A GRUVEL. **The Farm and Forest Wealth of Angola.** (Les ressources agricoles et forestières de l'Angola). — *La Géographie*, XXIII, N. 6, pp. 439-450.

The agricultural wealth of Angola is two-fold. In the Portuguese Congo and to the north of Angola stretch huge forests in which many kinds of woods, suited to high-class cabinet-making, grow ; there are also many cashew-nut trees (*Anarcadium occidentale*), but unfortunately their wood has no commercial value. Their fruit, when fermented, yields a bad quality of alcohol; the inhabitants use the pericarp of the fruit for medicinal purposes.

Port. W. Africa: Angola

To the South of the Loanda district, the coast running from the Chella mountains to the Bay of Tigris is generally arid, except along the river banks, where interesting plantations can be made.

Starting from Mossamedes, and going from west to east, Angola can be divided into three distinct sections. The first stretches from the sea to the Chella, a huge mountain range running nearly parallel to the sea-shore, of which some of the peaks reach an altitude of over 2 000 metres ; the soil in this section consists of almost pure sand. The second is that of the high table-lands, enjoying the coolest and most agreeable climate in the Colony ; live-stock is raised there on an extensive scale as the pastures are plentiful and excellent. All European grain corps are also raised there: wheat, rye, barley, oats, etc.; and fruits such as grapes, apples, pears, peaches are grown.

The third section is to the east of the table-lands, and gradually slopes down ; the climate is tropical, hot and damp. Cacao, coffee, and cotton trees grow in this section. It is also suited to cattle and sheep breeding.

A great future may await this large Portuguese colony, when all the inland railway systems are completed.

Angola is not only rich agriculturally and in forests ; the section south of the Portuguese Congo and west of the Conango river has great mineral wealth. In the big mountain ranges there are mines of all sorts, more especially of lead, silver, copper, gold, and even some beds of precious stones. In the Loanda district, coal mines have been found, and salt mines between Mossamedes and Port-Alexander. Lastly, in the region bordering on the Bay of Tigris, there are important guano beds, especially at the extremity of the Bay and at the mouth of the Rio Cuneno.

The most prosperous industry of Southern Angola is perhaps fishing. Fish of all sorts, which abound in these waters, are caught with all kinds of apparatus ; they are opened, cleaned and placed in

strong brine, then dried in the sun and covered with sand. This fish is sold at from 200 to 250 frs. (£ 8 to £ 10) per ton. Lobsters are plentiful and are sent to Europe in ships fitted with tanks. Another industry which is growing there is that of whale fisheries (1).

New Plantations and Forests in the Belgian Congo. (Création de cultures et de forêts au Congo belge). — *Bulletin officiel du Congo Belge*, IVe An. N. 9, pp. 448-450. Bruxelles, 3 Juin 1911. 2049

The International Forestry and Mining Company of the Congo, incorporated by decree of November 6, 1906, was authorised on February 13, 1911, subject to the rights of the natives and others, to plant:

1) forests, outside all existing forests, on waste lands in the lots of Bongo and Bolingo. The maximum area of the forests to be planted by the Company on these lots is 200 000 hectares (494 000 acres) for the Bongo lot, and 100 000 ha. (247 000 acres) for that of Bolingo. Belgian Congo

2) plantations of various kinds on waste lands in the lots of Selenge, Lifumba-Lutoi, Lokolama and Ila. The maximum area of the plantations to be thus formed by the Company in each of these lots is the following:

10 000	haectares	(24 700	acres)	in the	Selenge lot;
10 000	»	(24 700	»)	» »	Lifumba-Lutoi lot.
20 000	»	(49 490	»)	» »	Lokolama lot.
8 000	»	(19 760	»)	» »	Ila lot.

A. DE SAPORTA. **The Vine-Growers' Congress at Montpellier. American vines; Direct Producing Vines; Protection against Hail; Sulphurous Acid in Wine-making.** (Le Congrès viticole de Montpellier: vigne américaine, producteurs directs; défense contre la grèle; l'acide sulfureux dans la vinification). — *Revue générale des Sciences pures et appliquées*, No. 13, pp. 516-517. Paris, 15 Juillet 1911. 2050

For many years past the grafted American vine has replaced, almost all over Europe, or is tending to replace, as in Algeria, the old ungrafted European vine. But this substitution does not take place everywhere with like facility; and even when it has been successful, France: Montpellier

(1) The chief products of Angola are coffee, rubber, wax, sugar from which rum is distilled, vegetable oils, cocoanuts, ivory, oxen and fish. The rubber output will soon be exhausted. Cotton plantations, formerly profitable, are now neglected. Tobacco is cultivated and manufactured for local consumption. Petroleum and asphalt are worked by a British syndicate. The colony contains large quantities of malachite, copper, iron, petroleum and salt. The chief exports are coffee and rubber. Large quantities of dry fish are also exported. *The Statesman's Year-Book* 1911, p. 1122. (*Ed.*).

innumerable difficulties arise in connection with the product obtained, and with the economic crises consequent on its sale.

At the Congress at Montpellier, which was held from the 17th to 20th May, the study of these several questions was resumed, and then discussed by French and foreign experts.

When a supposed Phylloxera resistant variety of American vine is planted in a given soil and grafted with a scion which it is to nourish, can one be sure of success? An affirmative reply cannot be given, as far from depending, as was formerly supposed, solely on the percentage of lime in the soil, results also depend on the readiness with which this lime is assimilated (and on this one point enormous differences are noted), on the moisture of the soil, on its natural or procured fertility, the former favouring chlorosis, the latter reducing it. There is no fixed scale of resistance, fitness, productive capacity, and duration for pure American, cross-bred American, and Franco-American vines. Experience alone can decide these points.

On the other hand, some advantages results from this complex situation. Thus, plentiful dressings of fertilizers and careful cultivation may revive vines which are failing from old-age or exhausted by the attacks of the phylloxera.

The debates of the Congress did not point to any great advantages in favour of vines that are direct producers. Indeed, some experts only advise them as scions for grafting, as when they are nourished by a resistant American stock, and thus preserved from phylloxera; their exotic sap confers on them a high degree of resistance to fungoid diseases (oidium, mildew, black-rot), which is a matter for consideration in some districts. Many of them supply a very deeply-coloured wine of fair quality; this would make them valuable in the South of France to replace the Petit-Bouschet used to give body to the Aramon vine which was the great productive variety. The ultra-fertile fraction of the vineyard would thus be increased. Nevertheless, direct producers may still be of economic importance, by enabling the small farmers or métayers of the South of France to obtain, with little expense and labour, a wholesome household wine for their families.

But this result does not seem to have been yet definitely achieved, and the right variety has still to be discovered.

Other interesting questions formed the subject of reports and debates in the Congress. Some refer to the protection against and the resistance to insect pests and fungoid diseases. (1)

A clear and categorical decision in the matter of protection against hail has never yet been formulated. Formerly proposals

(1) See this *Bulletin*, Abstract 2278. (*Ed.*).

were made to install in the fields a series of hail-protecting poles (*poteaux paragrêles*); this plan is again coming into favour in the Department of Vienne, at least in the form of very tall lightning conductors with many points, which are placed on the steeples and bell-towers. Perhaps the protection afforded against hail by rockets is greater.

As an offset to these disputable and disputed physico-chemical experiments or theories, there are some questions connected with the cultivation of the vine on which all are agreed. One of these is the use of sulphur dioxide in wine-making, which paralyses noxious microbes or diastases, increases the fixed acidity, and diminishes the volatile acidity of the wine. By using this reagent in the form of potassium bisulphite its quantities may be regulated; it is especially favourable to the improvement of the naturally inferior products of the Bas-Languedoc. The use of selected ferments after treatment with this bisulphite is a valuable adjuvant, but undoubtedly scrupulous attention to cleanliness in the vintage apparatus will allow of its being economised. Finally, the use, which is constantly spreading, of co-operative wine-making and cellars will enable the poorest farmers to make their wine with the best methods, and to store their small vintage safely in improved cellars.

Before closing, the Congress of Montpellier listened with interest to two reports on questions which cause anxiety for the future. One dealt with inter-planting in vineyards of fruit trees (*cultures intercalaires*) in the Bas-Languedoc, where the too exclusive cultivation of the vinehas often had disastrous results. The other treated of motor-cultivation, which will make it possible to economise considerably on labour. The members of the Congress visited a magnificent wine-cellar in the Thau district, where perfected machinery, worked by electricity, makes it possible to handle large quantities of grapes and to produce choice wine with very few hands.

Sulphur dioxide, ferments, cleanliness, co-operation and machinery: such are the latest helps in modern wine-making. Are the viticulturists of to-day equally well-armed against agricultural strikes, storms, fungoid diseases and insect pests?

The Fifth International Dairy Congress at Stockholm. The Qualities of Good Milk. (V.e Congrès international de laiteries de Stockholm. Les qualités d'un bon lait). — *L'industrie du Beurre*, 6ème An. No. 28, pp. 330-331. Niort, 1911. **2051**

The Fifth International Dairy Congress, held at Stockholm, opened on June 28, 1911. There were 900 adherents ; 22 Govern- **Sweden: Stockholm**

ments and 90 Associations were officially represented. The following are some of the resolutions passed :

1. Milk, to be used as milk, should have nothing added to it and nothing taken away; and should also comply with the following conditions as to milking, composition and storage :

a) It should be the result of the complete milking of healthy, well-fed and well-kept milch cows. The cows should receive no tainted, or excessively watery food, nor any likely to impart an aromatic or marked flavour to the milk, or at least only in limited quantities. Animals which have been treated with medicine which may pass into the milk, should be temporarily disqualified from supplying dairy milk.

b) As soon as the milk has been drawn, it should be filtered; so that 40 c. c., centrifugated to at least 1 000 revolutions to the minute, during 5 minutes, should only leave traces of a brownish sediment (organic waste or dregs). Immediately after drawn, the milk should be cooled, as far as local conditions allow, in any case to at least 10° C.

c) It is preferable that the milk be the product of a mixture of the whole milk of at least three cows.

d) The fatty and albuminoid contents of the milk should be up to a certain standard of requirement, to be determined by taking into account the local conditions of production.

e) Tested by Barthel's reducing agent, there should be no discolouration during the three hours; and the index of catalysis should not be higher than 3.

f) Its freezing point should vary between — 0.54° and — 0.58 C. (1)

g) It should not coagulate on the addition of an equal volume of alcohol at 70 %, and should keep, so as to stand this test again 36 hours after being milked.

h) The taste, flavour, colour and consistency of the milk should be normal.

i) It should be handled only by healthy and expert people, with all due regard to cleanliness.

II. Condensed milk is the product obtained by the partial evaporation of the water of pure milk, pasteurised or sterilised, with or without the addition of sugar (saccharose).

Milk used in the preparation of condensed milk should have undergone no alterations in its composition, except those which normally result frum pasteurisation, sterilisation, homogenisation, or the possible addition of cream, or saccharose.

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(1) See below, Abstract 2213. (*Ed.*).

No preservative, other than saccharose, is admissable in condensed milk.

Condensed skimmed milk, is condensed milk prepared from skimmed milk. It may only be sold as « condensed skimmed milk », and this must be stated in bold type on the tin.

III. Desiccated milk should be sold with the following indications :

a) The percentage composition, and more especially the fat content, and a statement as to the kind of milk used in its preparation (whether whole milk ; semi-skimmed milk ; or skimmed milk).

b) Date of preparation.

c) Mode of preparation.

d) Remarks on its solubility (in how much water and whether in cold, hot, or boiling water).

e) How the desiccated milk should be stored.

f) The sale of desiccated milk prepared from semi-skimmed milk should be forbidden.

2052

Royal International Horticultural Exhibition, London, 1912. — *The Gardener's Chronicle,* Vol. XLIX, No. 1272, p. 303. London, May 13, 1911.

Great Britain : London

An International Horticultural Exhibition will be held in London from the 22nd to 30th May 1912. There will be special sections for diseases of plants, injurious and useful insects, plant physiology applied to the cultivation and production of plants, and sections for the different applications of the Mendelian theory.

2053

E. Perrot. **The Second International Rubber Exhibition in London, in June 1911.** (La deuxième Exposition Internationale du Caoutchouc à Londres). — *La Quinzaine coloniale,* XV. An., No. 14, pp. 505-509. Paris, 25 Juillet 1911.

Great Britain: London

From June 26 to July 8 were collected together in the Agricultural Hall, London, not only all the documents connected with the past history of rubber, but all the requisite data for realising in its full extent the evolution of the rubber problem in recent years. Commercial rubber is still almost exclusively derived from wild rubber-plants; yet the produce of the plantations held the most prominent place in the London Exhibition; for the latter tend to replace the former, and the exhibition points decidedly to this conclusion.

The exhibits of Brazil, Peru and Bolivia were most significant, both for the quantity and quality of their blocks of truly superior *Hevea* rubber, prepared by the smoking process.

Samples of « Ceara » and *Castilloa*, from Brasil, Venezuela, and the Central American Republics were also on view.

All the African colonies exhibited their liana rubber, mostly from various species of *Landolphia*. A liana of this kind, known as *L. Paraensis*, has been discovered in Brazil. To this same group belongs the *Mascarenhasia*. The *Funtumia* was also on view.

By the side of these leading products are a whole host of others, the products of which are of interest, *viz.* : « Mangabaira » (Brazil), « Intisy » and « Kompitsé » (Madagascar) , *Clitandra* (Ivory Coast) *Ficus* (Asia), « Guayule » or *Parthenium argentatum* (Mexico) and « Jelutong » (*Dyera costulata*) of the Malay archipelago.

The Federated Malay States, Ceylon and the Dutch Indies rivalled each other in their exhibits of the methods of cultivating *Hevea* and the products obtained. France was represented by the first rubber obtained from Cochin-China.

« Ceara » is likewise the subject of interesting experiments, especially in German East Africa. Most interesting results have been obtained with *Castilloa* in Mexico (Soconusco).

Funtumia is a tree which should be grown wherever possible. Liana plantations are not likely to interest European capitalists.

A more or less elastic product described as « synthetic rubber », obtained by first making isoprene, and using it as the basis for the new product, was on view at the Exhibition.

Notwithstanding the many publications on the methods of tapping *Hevea*, an agreement has not yet been come to as to the best methods and apparatus.

Many methods are in use for coagulating the rubber latex, but it would seem that the last word has not yet been said on this subject.

The Exhibition clearly showed that the wild and the cultivated product are now in open competition.

2054 FRANTZEN. **The Brussels Horse-Show of June 1911** (Die Brusseler Pferde Ausstellung). — *Deutsche Landwirtschaftliche Presse*, XXXVIII. J., Nr. 55, pp. 653-654. Berlin, 12. Juli 1911.

The 26th Draught-horse Show was held in Brussels last June, organized by the « Belgian Draught-Horse Society ». This Show was visited by American, Dutch, Bohemian, Argentinian, German, and other purchasers. Argentina and Italy are the most recent clients, and Belgium now does a large business with them.

Belgium: Brussels

The prize was competed for by 931 horses, coming from all the Belgian provinces. The different categories, classified according to age, were subdivided into three types: heavy, semi-heavy, and light.

Ardenne horses from Luxemburg and part of the Province of Namur, formed classes by themselves.

The grand prize, awarded to the best stallion or mare of four years, is conferred each year.

The Growth of the United States Department of Agriculture. 2055
Experiment Station Record, Vol. XXIV, No. 5, pp. 401-407. Washington, April 1911.

United States

The growth of the National Department of Agriculture during the past ten years has far exceeded that in all its preceding history. Going back to 1839, when $ 1000 was appropriated for agricultural statistics, and including every dollar appropriated out of the Treasury of the United States for agricultural purposes up to 1900, the total sum appropriated was $ 45 102 616; while the aggregate of all the money appropriated from the end of 1900 to the end of the current fiscal year reaches a sum nearly double this, or $ 90 012 058. This year the Department has at its disposal $ 15 470 634. One of the largest new items is an appropriation of $ 1 000 000 for fighting and preventing forest fires in the National Forests in cases of extraordinary emergency. The allotments of the various bureaus are enumerated.

A. A. Neugerman. **The Danish Moorland Society. Land-clearing and Afforestation in Denmark.** (Naar Danemarken). — *Tijdschrift der Nederlandsche Heidemaatschappij*, 23 J., A. 7, pp. 189-223 + fgs. Utrecht, 1 Juli 1911. 2056

Denmark: Jutland

This is a complete study on the clearing of moorlands in Denmark, and the conclusions come to are as follows:

1. — Land-clearing in Denmark (Jutland) is done under unfavourable conditions. The sterility of the soil, the high winds, and night frosts late in the year, prevent and hinder the work of the forester.

2. — Spruce (*Picea excelsa*) is the forest tree best suited to the soil; it also stands the high winds best.

3. — Sown with *Pinus montana*, the spruce makes good plantations, of vigorous growth, such as are rarely seen on cleared moorlands in Holland, for instance.

4. — Great care is taken in Denmark in preparing the soil, especially in ploughing.

5. — The system of sowing a preliminary crop of lupins, followed by a farm crop raised with the help of manure, as is generally done in Holland, is not followed.

6. — The first experiments in clearing moors were made by the Danish Government. But it was only after the Danish Moorland Society was founded in 1866 that the clearing of moors in Denmark has been carried out on a considerable scale. The area under forests has thus risen from 2.4 % of the total area, in 1866, to 6. 3 % in 1910: that is to say it has increased almost threefold.

7. — The Danish Society is supported by the people and the Government. It has 5000 members, and there is also an Afforestation Union, with 56 sections and over 25 000 members, which cooperates in the work of the land Society. The Government grants an annual subsidy to the Society of 400 000 crowns (560 000 frs.), and this grant is made in spite of the fact that the Society itself is a great land-owner, possessing 1800 plantations, covering 64 372 hectares (159 000 acres). The rules of the Society, however, require that in case of liquidation its property should revert to the Government.

9. — In a view of promoting afforestation, the Danish Government grants, through the agency of this Society, one third of the cost of clearing lands, on condition that the area thus cleared is set aside for permanent forests.

10. — The Danish Moorland Society, besides its work in the field of afforestation, has been most useful in encouraging agriculture in general; more especially the improvement of hydraulic conditions, which are sometimes of importance to whole sections of the country. It has also done good work in seeking for marl deposits and encouraging their utilisation. This has been more especially of benefit to the small farmer.

11. — The results obtained by the Danish Moorland Society confirm the experience of the Dutch Moorland Society, which shows that much can be done by private initiative to encourage the clearing and cultivation of waste lands of all kinds, although substantial government support is also requisite.

2057 **The Rothamsted Experiment Station**. *Nature*, Vol. 86, No. 2174, p. 599. — London, June 29, 1911.

The Society for extending the Rothamsted Experiments met at Harpenden on June 16, and has issued the following report :

Great Britain: England: Rothamsted

During the past year the work of the Rothamsted Experiment Station has been considerably extended, more particularly in its investigation of the effect upon the fertility of the soil by heating and treat-

ment with antiseptics which destroy the larger organisms there present (1).

A special assistant has been retained to deal with the investigation of greenhouse soils, which, despite their richness in manure, have become « sick » and unable to carry crops. The same factor appears to be concerned in the sickness of the soils of sewage farms, and this question is also under investigation. The examination of the life-history of the larger organisms in the soil has been undertaken in the Rothamsted Laboratory by Mr. T. Goodey, who was appointed for that purpose to a Mackinnon studentship by the Royal Society.

Papers on this question have been published during the year, also on the ammonia content of the atmosphere, on the weeds of arable land in relation to the soils, on the nutrition of plants by non-nitric sources of nitrogen, and on the experimental error attaching to field trials. The Board of Agriculture has also published on behalf of the station an exhaustive report (207 pp. 56 maps and figures) on the soils and agriculture of the South-East of England (2).

Through this additional work the expenditure of the station has exceeded its income by £1000, and a deficit of £1300 has now accumulated.

The Development Commissioners have promised, through the Board of Agriculture, a grant of £2000 for the current year's work; and it is hoped that some assistance of the kind will be continued, in order to provide for the further extension of the work of the station.

To this end it has become necessary to take a lease of the home farm and so secure further land for experiment, and to erect additional laboratory accomodation.

It is estimated that £6000 will de required for these purposes. On the appeal of the Society subscriptions for £2763 have already been received or promised (3).

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(1) Cp. *The Science and Pratice of Farming during 1910 in Great Britain*, p. 116. Int. Inst. of Agric., Rome. (*Ed.*).

(2) A. D. HALL and E. J. RUSSELL. *A Report on the Agriculture and Soils of Kent, Surrey and Sussex*. Published by the Board of Agriculture and Fisheries. London, 1911. (*Ed.*).

(3) For a recent general account of the Rothamsted experiments, from their beginning in 1842, see: A. D. HALL, *The Book of the Rothamsted Experiments*. Issued with the Authority of the Lawes Agricultural Trust Committee. London, John Murray, 1905. (*Ed.*).

2058 **Work of the Berlin Experimental Institute for Cereal Products. Branding of Exported Flours. Mill-Wastes.** (Arbeiten der Versuchsanstalt für Getreideverarbeitung in Berlin). — *Mitteilungen der Landwirtschaftskammer für das Herzogtum Gotha*, 2 J., Nr. 13, pp. 97-98. Gotha, 1. Juli 1911.

German flour exporters, on producing special certificates, receive back the import duty paid on 100 sacks of rye or wheat whenever they export 65 sacks of rye-flour or 75 of wheat-flour.

Germany : Berlin

Five brands of wheat-flour and three of rye-flour have been recognised and the authorities are guided by this classification in reimbursing the import duty paid on wheat or rye.

These brands have been settled on and sampled by the Berlin Experimental Institute; which is authorised to act as arbitrator in disputes between the authorities and the exporters, on the question of the right classification of the brands of flour exported.

The Experimental Institute also inspects the mill waste imported into Germany as cattle food, known under the general name of « *Kleie* ». This inspection is required, as such waste enters Germany duty free, if it is really suitable for feeding cattle.

The Experimental Institute does much work in this field, which is very valuable for the solution of the forage question on the one hand, and for preventing competition with German cereals on the other; at the same time it acts as an inspector of food-stuffs.

2059 G. Hausen and K. Hofmann. **Second Report on the Work of the Experimental Field at Dikopshof, connected with the Royal Agricultural Academy of Bonn-Poppelsdorf.** — (Zweiter Bericht von Dikopshof). — *Landw. Jahrbücher*, XL Band, Ergänzungsband I, pp. VI+430, 14 pl. Berlin, 1911.

This report gives the results of experiments made in 1908 and 1909. It is divided into three parts. The first deals with meteorological observations; the second with the economic organization of the experimental ground; and the third is the report proper on the results of the experiments.

Germany : Prussia : Dikopshof

The experimental ground at Dikopshof, attached ever since 1904 to the Royal Agricultural Academy of Bonn-Poppelsdorf, occupies an area of 125.3 hectares (309 acres), consisting almost entirely of arable land. In April, 1908, the small farm of Maarhof (2.3 ha. = 5.5 acres) was added to it.

The total production of the last four years amounted to 254 253 marks, or 2136.58 marks per hectare (£42.6*s.* 5*d* per acre) of cultivated land.

Besides the income available for experimental purposes, the Experimental Field received in recent years from the State an annual grant of about 10 981.65 marks (£552 6*s*) to meet the expenses entailed by costly comparative experiments, organized to determine the productive capacity of several breeds of live-stock.

The gross average income per hectare of the estate has been, for the last 4 years, 908.07 marks (£18 7*s* 6*d* per acre). It is largely derived from the high yield of the milch cows, which has been worth 415.20 marks per ha. (£8 4*s* 7*d* per acre).

The experiments described in the report are mostly the continuation of those begun as far back as 1904. They include comparative experiments in the cultivation of various varieties of wheat, oats, rye, etc. sugar beets, mangels, and potatoes; experiments in cultivating the soil, sowing and manuring; and in feeding cattle. A special study is being continued on the producing capacity of the various breeds of live-stock. This study was begun in 1897 on the Poppelsdorf estate; it deals not only with the « Schwytz », « Simmenthal » and East Frisian breeds, with which the previous report dealt, but also with the Dutch East Prussian, « Breitenburger » and « Jeherländer » breeds.

New Experiment Station for Cotton in German East Africa. (Eine neue Baumwollversuchsstation). — *Deutsches Kolonialblatt*, XXII. J., Nr. 15, p. 553. Berlin, 1. August 1911. **2060**

A new experiment station for cotton has been opened at Myombo near Kilossa.

To the south of this station stretches a wide extent of land admirably suited to cotton plantations. The land is flat, the soil is free from stones, rich in humus, light and very porous. It can easily be irrigated by means of the Myombo torrent. **German E. Africa: Myombo**

Demonstration Fields in Brazil. (Decreto N. 8768, de 7 de junho de 1911. Dà regulamento aos campos de demonstraçâo creados pelo decreto N. 8319 de 20 de outubro de 1910). — *Diario Official, Estados Unidos do Brasil*, A. 4., N. 38, pp. 7287-8290. Rio deJaneiro, 15 de junho de 1911. **2061**

By a presidential decree of October 20, 1910, demonstration fields were organized in Brazil. The bye-laws regarding these experiments are now published; they may be summarised as follows: **Brazil**

The lands on which the fields for demonstration cultures are to be installed must answer to the following requisites:

1) the climatic and agricultural conditions must correspond to the requirements of the plantations to be worked ;

2) their physical formation and chemical composition must be representative of the principal types of land cultivated in a whole region ;

3) they must be situated in populous districts, so that the fields may be easily visited and the results obtained readily ascertained;

4) they must be traversed by permanent watercourses for purposes of irrigation.

The fields must be at least 30 ha. (74 acres) in extent, and have nurseries annexed for the production and distribution of plants and seeds. Except for investigations into the mechanical constitution of the soil, and seed testing, all chemical, phytopathological, and entomological research work is to be carried on in the special Institutes.

The staff of the demonstration fields will consist of :

1 director, who will also act as travelling lecturer,
1 assistant,
1 head cultivator,
1 mechanic,
1 stock-man.

The fields are provided with houses for the managing staff, an out-house for machinery and agricultural implements, a store-house for seed, a covered dung-heap with pumps for distributing the liquid manure, bee-hives, a silk-worm nursery, a farm-yard, a stable, a workshop for the machinery and implements in use, a 3rd class meteorological station.

The fields are inspected by the agricultural inspectors.

Other fields besides those above described may be opened ; such as for demonstration crops on public estates, or those of agricultural or other associations, or annexed to primary rural schools.

2062 L. DAIRE. **How to train Dairymen.** (Comment faire l'éducation professionnelle des producteurs de lait). — *L'Industrie du Beurre*, VI année, N. 25 and 26, pp. 289-292 and 301-303. Niort, 25 Juin 1911.

France As a result of the industrialisation of dairy work, and the preparation of butter and cheese, the owner of cows gradually ceases to do dairy work. If technical improvements are to be made use of, milk producers must be trained to their business. Improved imple-

ments and methods cannot better the raw product, the inferior quality of which is injurious to the quality of butter or cheese.

It would be desirable that very severe legislation, modelled on that existing in a few countries, should provide for the sanitary inspection of milk, and of the conditions under which it is obtained. Such legislation would do much to train the producer.

The producer of milk who is in most need of inspection is the one who supplies commercial or co-operative dairies, and who has less apparent interest in the quality of the raw milk. The co-operative and dairy associations possess the means of persuasion, propaganda and repression required for this task. They could add to their rules a brief but explicit chapter, stating the hygienic precautions which are necessary in cow-houses, and in feeding and milking the cows. No member should be admitted to an association unless he gives proof of his knowledge of these rules and precautions; and unless his cow-houses and milking apparatus are certificated as answering to the requirements of hygiene. A certificate of tuberculinisation should be required for all the milch cows, at least when the milk is to be sold as such. General assemblies, festivities, agricultural meetings are all occasions on which lectures could be delivered, with the help of experiments.

The milk collector, who acts as an agent between the producer and the co-operative, can assist in this educational work by being made responsible for the quality of the milk which he accepts for delivery.

Prize competitions form another valuable means of education. After thus stating his personal views, the writer gives a brief account of farm-training in France, and of the status of professional dairy training.

THE SWISS PEASANTS' SECRETARIAT. **The Income Derived from Agriculture in Switzerland in the Year 1909-10.** (Report of the Peasants' Secretariat to the Swiss Federal Department of Agriculture). Untersuchungen betreffend die Rentabilität der schweizerischen Landwirtschaft im Erntejahr 1909-10. — *Bericht des Schweizerischen Bauernsekretariats an das Schweizerische Landwirtschafts-Department. Landwirtschaftliches Jahrbuch der Schweiz*, pp. 1-148. Bern, 1911. **2063**

The data and conclusions given in this Report are based on a careful examination of accurate accounts supplied by 276 farms, — 37 not exceeding 5 hectares (12.3 acres), 113 from 5 to 10, 63 from 10 to 15, 41 from 15 to 30, and 14 over 30 hectares. **Switzerland**

Numerous and detailed comparisons are made between these five categories.

1. Percentage of work done by the farmer's family.
2. Capital invested in buildings and implements per cultivated hectare.
3. Increase in total working expenses for the periods 1901-1905, and 1906-1909.
4. Increase in cost of labour for the same periods.
5. Increase of receipts from live-stock.
6. Value of gross produce and working expenses per hectare.

The comparison drawn between the value of the gross product obtained and the cost of production per ha. is deserving of notice.

Increase of stock is entered under the heading for gross product; and working expenses include payments made on debts, interest, and the value of the work done by members of the family, estimated at the wages paid for hired labour.

	Gross product fr.	Working expenses fr.	Difference fr.
Farms of less than 5 ha .	834.05	1 034.49	200.44
» » from 5 to 10 ha.	755.85	780.22	26.37
» » » 10 » 15 »	653.44	687.45	34.01
» » » 15 » 30 »	631.97	645.70	13.73
» » over 30 ha. . .	529.07	562.22	33.15

In all these categories the working expenses exceed the value of the gross product. The considerable difference in the case of the 1st. category is accounted for by the fact that the capital represented by buildings and implements is inevitably disproportionate, in the case of small farms, and consequently entails very high interest.

The facts thus ascertained show that the value of the gross product does not cover the working expenses, if the farmer claim for himself and his family a fair compensation and 4 % interest on his capital. There is nothing else for him but to be satisfied with a lower wage-rate, or with a reduced rate of interest on his capital.

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(1) One hectare = 2.47 acres and one franc = 10 d. (*Ed.*).

Agriculture
Agricultural Physics, Chemistry, Botany.

PIERRE ACHALME. **Hypothesis on the Nature of Diastases.** — (Hypothèse sur la nature des Diastases). — *C. R. de l'Acad. des Sc.*, T. 152, N. 23, pp. 1621-1624. Paris, 6 Juin 1911. 2064

The most recent investigations seem to show clearly that diastases are specific catalytic colloids. The writer explains their specific and catalytic function by the following hypothesis :

The diastases presumably consist of colloidal granules, of an organic nature, having on their surface an electric charge, due to ions which are fixed there, and that result from the electrolytic disintegration of the salts of the organism. France

These granules charged with electricity are kept in motion by the Brownian movement, which would seem to be the *primum movens* of diastasic reactions. The specific nature of each diastase would thus be due to the chemical nature and relative proportion of the fixed ions to the colloidal granule, which behaves as a complex ion. This hypothesis connects diastasic action with the chemical phenomena produced by the ultra-violet rays. The writer's studies on the importance of the rôle played by viscosity on diastasic action point to a proof of this theory.

A. CHAUCHARD and MLLE. B. MAZOUÉ. **Action of the Ultra-violet Rays on Amylase, Invertin, and the Mixture of these two Diastases.** (Action des rayons ultraviolets sur l'amylase, l'invertine, et le mélange de ces deux diastases). — *C. R. de l'Acad. des Sc.*, T. 152, N. 24, pp. 1709-1711. Paris, 12 Juin 1911. 2065

The purpose of these investigations was to study the action of the ultra-violet rays on each of these diastases; and to see if it were not possible, in a mixture of several diastases, to isolate some by destroying the others. The results were as follows : 1. the attenuation of amylase and invertin by the ultra-violet rays is rapid at first and gradually grows slower. 2. Malt amylase is more sensitive to the ultra-violet rays than yeast invertin. 3. When mixtures of amy- France

lase and invertin are subjected to the rays, amylase is seen to become attenuated much more rapidly than invertin.

Thus, in a mixture of these two ferments, it is possible to destroy the amylase with the ultra-violet rays, but only to attenuate the invertin. This case thus affords an instance of the separation of two diastases by the action of the ultra-violet rays.

2066 GERBER. **The Diastases of the Latex of the Paper-Mulberry (*Broussonetia papyrifera*).** (Les Diastases du latex du Murier à papier). — *C. R. de l'Acad. des Sc.* T. 152, N. 23, pp. 1611-1614. Paris, 6 Juin 1911.

France

The prevailing opinion on the part played by latex in plant economy is that it is an excretion of no importance for the nutrition of the plant. Mr. Gerber's studies on the latex of the paper-mulberry would, however, seem to show that it possesses, like the pancreatic juices, three very active diastases, which act on fats, carbo-hydrates, and albuminoids. It is a real pancreatic juice of plants.

This vegetable pancreatic juice dissolves the reserve matter accumulated in the plant during the preceding period of vegetation, utilising it for the formation of the inflorescences and young leaves.

The three diastases are not contained in like proportions in all latexes; and in this also latex- plants behave like seeds, in which one kind of diastase usually prevails.

The study of these pancreatic vegetable juices is incomplete; it is a new field of research to which M. Gerber is now devoting himself.

2067 F. SCURTI & G. TOMMASI. **The Influence of Manures on the Composition of Seed.** — See Abstract 2088.

2068 JEAN DE RUFZ DE LAVISON. **Investigations on the Penetration of Salts into Protoplasm and on the Nature of their Toxic Action.** (Recherches sur la pénétration des Sels dans le Protoplasme et sur la nature de leur action toxique). — *Annales des Sciences Naturelles, Botanique*, 8ᵉ année, IX série, t. XIV, N. 1, 2, 3, pp. 97-193. Paris, 1911.

France

It would not be easy to abridge this lengthy study of M. de Lavison on the nature of protoplasm and on the conditions that influence its penetrability by salt solutions. Especially interesting is the part regarding the toxic action of salts.

The writer in a series of experiments has ascertained the following facts :

1. The perviousness of protoplasm to weak solutions is, contrary to current opinion, a phenomenon entirely different from its perviousness to strong solutions. In the latter case, protoplasm is quite pervious, without being killed, to those same salts which fail to permeate it in weak solutions.

In the case of weak solutions the alkaline and alkaline-earth cations, in conjunction with a non-toxic anion, readily penetrate the protoplasm. Salts of barium, and caesium, and the iodides have difficulty in penetrating; and some salts of aluminium, and yttrium, and most of the salts of the heavy metals cannot penetrate living protoplasm.

2. The toxic action of a molecule is an additive property of acid and basic radicals, in a great number of salts. Whereas in the case of acids and bases, it is due to properties acquired by the molecule, owing to its non-saturation.

One cannot speak of the toxic qualities of the ions or radicals of H and OH. Moreover, it is proved that the toxic salts are those which either fail to penetrate, or penetrate with difficulty, into living protoplasm.

3. Living protoplasm is extremely unstable in its behaviour to a large number of salts; and it does not possess some of the qualities which should correspond to its high content in albuminoids. This is interesting, as it seems to show a modification in the properties of the constituent parts of protoplasm, probably due to the special physical conditions under which it exists in life. Protoplasm may be considered as a membrane subject to constant modification.

On the strength of these facts, the writer sets forth some general ideas which, in his opinion, are the necessary deductions from them.

Living protoplasm probably does not coagulate immediately, on contact with the salts of the heavy metals; and this is all the more remarkable as solutions of albumen coagulate immediately.

Facts seem to run counter to the theory which would make the perviousness of protoplasm depend exclusively, in the case of a given salt, on the solubility of this salt in the constituent elements of protoplasm.

It is impossible to base a theory of toxic action on the coagulation of protoplasm, or on chemical considerations. It is also unlikely that this can be done by basing the causes exclusively on the equilibrium between the ions contained in the protoplasm.

The curious antagonism between a toxic salt and living protoplasm may suggest the idea that the nature of the toxic action, like that of perviousness, consists principally in very special molecular actions, which may perhaps become better known by the study of certain deformations of the protoplasmic membrane.

2069 G. André. **On the Diffusion of Saline Matter throughout certain Plant Organs.** (Sur la diffusion des matières salines à travers certains organes végétaux). — *C. R. de l'Acad. des Sc.*, T. 152, N. 26, pp. 1857-1860. Paris, 26 Juin 1911.

The purpose of these investigations was to find out what fraction of mineral matter can dialyse through the membranes of certain organs, when plunged into pure water to which a little formol has been added to avoid all putrefaction, and left there for several months.

The experiments dealt with the diffusion of sea-salt (or rather of its chlorine) expelled from an organ such as a potato tuber.

The experiments showed that complete exosmosis, through the tubers, of a soluble salt which does not enter into combination with organic matter is slow. This slowness is principally accounted for by the size of the organ, and the difficulty liquids find in moving from one cell to another. But at the end of a long enough period the elimination of the salt may be regarded as complete.

2070 J. F. Preston and F. J. Philipps. **Seasonal Variation in the Food Reserves of Trees.** — *Forestry Quarterly*, Vol. IX, No. 2, pp. 231-243. Cambridge, Mass., June, 1911.

A contribution from the Botanical Department of the University of Michigan.

The work reported and that of the European investigators compared with it, may be summarized in the following statements :

United States: Michigan

1. There is in the stems of all trees in temperate climates a reduction, in November and December, of the amount of starch present in autumn: the reduction being so great, in some trees, as to lead to the complete disappearance of the starch throughout the stem; while in most trees the xylem retains more or less starch, and in others, again, both xylem and phlœm retain some starch through the winter.

2. A few trees have shown a considerable increase of fat in the phlœm and xylem in late autumn, or early winter. But there is insufficient evidence for the belief that starch is transformed into fat. In most trees the increase of fat is not marked.

3. The trees that contain considerable fatty matter in winter are some of them hard-woods and some of them soft-woods, as *Populus deltoides*, *Tilia americana*, and *Juglans nigra*: the first two being soft-woods and the last a hard-wood. The soft-wooded *Salix alba* contains but little fatty matter, but considerable starch in its stem in winter. From these results and those of European observers it would hardly seem justifiable to name broad-leaf hard-woods generally as « starch trees », and the soft-woods and gymnosperms generally as « fat trees », as proposed by Fischer.

4. As claimed by Sablon, the work reported seems to indicate no great increase in the content of sugar in stems and roots: except in the spring, as the buds unfold.

5. In the root, the transformations do not keep pace with those in the stem; and starch remains the year round, the greatest reduction occurring in spring. The roots of nine trees studied in the reported work showed much starch, in both phloem and xylem, all through the winter.

6. The transformations of the carbohydrates are largely dependent on the season, though the immediate conditions of temperature have some effect. Thus, Russow and d'Arbaumont found that several species, kept in a warm glass-house over winter, lost their starch at the usual time. And in the work reported in this paper, roots of trees, exposed to the severity of winter by removing their covering of earth, did not appreciably reduce their starch. On the other hand, it is known that a stem, without starch in winter, will form starch in a few days after exposure to a warm temperature. Russow reports several species of trees that retained considerable starch in the stem through a mild winter; but lost much or all of their starch in the next winter, which was severe.

7. Fabricius found that the older stems of *Picea excelsa* did not transform its starch to so great an extent as the younger stems. Several of their trees examined in the present work have shown the same thing; and hence it is quite likely that it is a general phenomenon.

8. Sablon has pointed out that the maximum for total carbohydrate reserves for deciduous trees is at the fall of the leaf in autumn. Whereas the maximum for evergreen trees is at the opening of buds in the spring.

9. Finally, the work of Sablon and Schellenberg indicates that the principal carbohydrate reserve of trees in winter is cellulose. The writers express the wish that the methods employed by these two investigators were a little more convincing. Sablon obtained positive results by chemical analyses; and he and Schellenberg report having observed thinning of the cell-walls in spring. In other cases the

walls showed a loss of refractive properties, in cases in which reduction in thickness could not be seen. There need be nothing doubtful in the claim of a loss of substance where loss of thickness could not be seen ; for enzyme action produces exactly this effect at the first solution of walls in some seeds (Newcombe).

2071 J. M. PETRIE. **The Rôle of Nitrogen in Plant Metabolism.** — *New South Wales Linnean Society*, March 29; abridged in *Nature*, No. 2173, Vol. 86, p. 576. London, June 22, 1911.

Australia: New South Wales

The distribution of nitrogen in the seeds of Acacia pycnacantha. The seeds of *Acacia pycnacantha* contain 4.51 per cent of nitrogen in various forms. The changes in the solubility of the protein are examined in various stages. A study of the action of various protein precipitants is made. Quantitative precipitation by alcohol of increasing strength brings out a differentiation of the nitrogen - values, and shows the presence of at least two different proteins. The protein-free solution contains: 1) substances which easily set free ammonia when distilled; 2) compounds which liberate ammonia only when hydrolysed with dilute acids ; 3) compounds which are only decomposed by boiling with strong acids for prolonged periods; 4) basic compounds.

The nitrogen of ripening seeds. — Experiments on the wild tare, *Vicia sativa*. As ripening progresses, the seeds gain in protein and also in non-protein nitrogen compounds, the mature seeds containing the largest amount of each. The view that the proteins are formed at the expense of non-protein nitrogen compounds is not supported. All ripe seeds examined contain non-protein nitrogen, which remains unaltered throughout the dormant state.

A series of experiments on *Vicia Faba* showed that when the seeds are left enclosed in the isolated pods a transference of material takes place from the pods to the seeds. This results in an increase in total nitrogen and protein nitrogen, and a small increase in non-protein nitrogen. The seed-protein could only have been augmented by the addition of protein or protein-derivatives, and the only possible source is the pods.

The occurrence of potassium nitrate in plants. — The occurrence of an unusually large amount of potassium nitrate in the leaves of *Solandra grandiflora* is recorded; 2.01 per cent in the plant dried at 100° C.

P. Mazé. **Fermentation as a Digestive Process. Further Evidence afforded by the Study of Denitrification in the Vegetable Kingdom.** (Les phénomènes de Fermentation sont des actes de Digestion. Nouvelle démonstration apportée par l'étude de la dénitrification dans le règne végétal). — *Annales de l'Institut Pasteur*, Tome XXV, N. 4 et N. 5. Paris, 25 Avril, et 25 Mai 1911. 2072

With a view to generalising on the principle that the phenomena of fermentation are acts of digestion, the writer has undertaken the study of another fermentation, quite as important as alcoholic fermentation : denitrification. France

Hitherto the phenomena of denitrification have found a simple theoretical explanation in the fact that nitric acid, which can readily give off oxygen to aerobic bacteria deprived of air, allows them to develop under anaerobic conditions.

The writer shows that this conception fails to attribute the right significance to the reduction of nitrates by bacteria ; this fermentation is the result of the assimilation of nitric nitrogen. Generally nitric acid is transformed into ammonia, without its being possible to prove the existence of intermediary products. Denitrification reveals their presence in some special cases ; and thus justifies the affirmation that they always exist as transitional forms.

The writer establishes the following points in support of his theory :

1. The reduction of nitrates does not modify the nature of the fermentations produced by denitrifying microbes.

2. The reduction of nitric acid by anaerobic ferments is due to the evolution of bacteria.

3. Ferments which give off hydrogen are not all denitrifying ferments.

4. The reduction of nitrates by anaerobic ferments, which give off hydrogen, can occur without the formation of apparent transitional forms.

5. Nitrates support both anaerobic and aerobic life.

6. The hydrogen of fermentation is the chemical agent of which the anaerobes avail themselves to assimilate the nitrogen of nitric acid, the sulphur of sulphuric acid, and perhaps the phosphorus of phosphoric acid. Methane may possibly act the same part as hydrogen in relation to phosphoric acid.

7. The most active denitrifying ferments should be considered as those best adapted for the assimilation of nitric acid.

8. The mineral media employed by Winogradsky for isolating nitric ferments are also the best media for denitrifying ferments.

9. The denitrifying bacilli, obtained in Winogradsky's mineral media, preserve their strictly aerobic character in the presence of nitrates.

10. In mineral media of special composition, the denitrifying bacilli produce nitrous acid.

11. These bacilli decompose alkaline nitrates when brought in contact with the air, but not when protected from oxygen.

12. The higher plants reduce nitrates, giving rise under special conditions to the formation of nitrous acid and to the gaseous derivates of nitrous acid.

13. In a one per thousand solution of potassium nitrite, the higher plants give off oxygen in a vacuum and in the dark.

14. The higher plants assimilate nitrous acid ; they develop normally when nitrites are supplied as their sole source of combined nitrogen.

2073 MAZÉ. **Studies on the Formation of Nitrous Acid in the Living Cell**. (Recherches sur la formation d'Acide Nitreux dans la Cellule vivante). — *C. R. de l'Acad. des Sciences*, T. 152, N. 23, pp. 1624-1627. Paris, 16 Juin 1911.

France

The writer has succeeded in proving that the production of nitrous acid in the cells is probably a function common to all living bodies. He has isolated from the soil and from plant juices the following organisms: a yellow aerobic *Garcina*; three mobile aerobic *Coccobacilli* ; one mobile sporogenous *Bacillus* facultatively anaerobic; one mobile filamentous aerobic soil *Bacillus*. All these produce nitrous acid in ordinary media; they produce less in mineral than in organic media ; but they do not all produce the same quantity. Active aeration hinders the formation of nitrous acid.

An emulsion of these organisms in distilled water carefully spread on tubes of agar gives, after one or two hours, according to the age of the culture, a nitrous acid reaction.

These facts prove that the atmospheric nitrogen has no part in the phenomenon ; that the nitrous acid is formed at the expense of combined oxygen, as also in the presence of free oxygen; that it is due to a nitrogenous function of the component parts forming the cell. But it is impossible to prove whether the nitrous acid exists free or in combination, as the quantities produced are too minute.

ACH. GRÉGOIRE. **The Action of some Salts, capable of Hydrolysis, and of Colloids on the Higher Plants.** (L'action sur les végétaux supérieurs de quelques Sels hydrolysables et de quelques Colloides). — *Bulletin de la Societé Chimique de Belgique*, 25ème année, N. 2, pp. 85-103. Gand, Février 1911. 2074

A first series of results, obtained in 1909, has already been published by the writer in this same *Bulletin de la Société Chimique de Belgique*, 1910, N. 24, p. 200. These further researches confirm the conclusions reached, as the result of previous studies, on the probability of the special action on vegetation of certain salts capable of hydrolysis, but devoid of all nutritive action. Belgiu

The experiments were made on barley, the ash of which is distinctly acid (1); and on beets, the ash of which is alkaline.

Each series of experiments was made with two pots containing 1 litre of a nutritive solution (calcium nitrate, sodium and potassium chloride, magnesium sulphate, monopotassic phosphate, traces of ferric chloride). The 1st series served as a control; the others, with the respective addition of 3 gr. of silica; 3 gr. of hydrated alumina; 3 gr. of straw gum ; 3 gr. of calcium laurate; 3 gr. of calcium palmitate ; 3 gr. of calcium humate; 3 gr. of calcium carbonate ; 3 gr. of analcite (a mineral belonging, like heulandite, to the group of zeolites); 3 gr. of heulandite.

The following is a summary of the chief facts noted during the growth of the plants :

Barley. From the very first weeks, the plants which had been given silica, analcite and heulandite were notably ahead of the control plants. The plants to which alumina was given remained behind, followed in decreasing growth by the plants treated with palmitate, laurate, carbonate and gum. Last of all came those plants which had received calcium humate, and which died after 4 weeks. The plants which received silica, analcite, and heulandite, tillered well and seemed to develop as normally as healthy plants in the open field.

Beets. Their appearance was quite different.The plants treated with calcium humate were from the very first strikingly in advance of the others. They grew large leaves of a healthy appearance, quite comparable to the leaves of beets grown in the open field.

The conclusions arrived at are : 1, Hydrated silica, zeolites, and perhaps alumina, exert a beneficial effect on barley; and calcium hum-

(1) That is, with predominance of silica.

ate, alumina and calcium carbonate on beets. 2, Humate and carbonate of lime are very injurious to barley; and unstable silicates to beets; straw gum, and calcium palmitate and laurate to both plants. It would thus seem that the behaviour of cereals, *i. e.* plants with acid ash, and of beets, *i. e.* plants with alkaline ash, is diametrically different.

The results so far obtained are too incomplete to permit of an explanation of the mechanism of this action; nevertheless they supply some useful indications. For the time being, these investigations have no practical application in view; but the concordance existing between observations made in practical farming and scientific investigations with the results supplied by these experiments is remarkable, and may become of practical importance.

075 ÉDOUARD HECKEL. **The Action of Cold, Chloroform, and Ether on *Eupatorium triplinerve* Vahl.** (De l'Action du Froid, du Chloroforme et de l'Ether sur l'*Eupatorium triplinerve* Vahl (Ayapana). — *C. R. de l'Acad. des Sc.*, T. 152, No. 26, pp., 1825-1827. Paris, 26 Juin 1911.

Ayapana (*Eupatorium triplinerve* Vahl - *E. Ayapana* Vent.), when dry, develops in its leaves and stalk, which are scentless when green and living, a very noticeable scent of melilot. This melilot-
ance coumarin scent only develops in ayapana when the whole plant, or a detached leaf, is quite dry, this desiccation taking rather a long time.

On the other hand, this scent develops quickly under the action of cold, produced by pure methyl chloride; as also under the action of chloroform, or of sulphuric ether (1).

This action is comparable to that which the writer has studied in the case of the action of cold and anaesthetics on officinal melilot.

As in the case of melilot, the odoriferous principle does not exist as such in the plant ayapana; but develops under the action of the agents above referred to, produced during plasmolysis.

Probably ultra-violet rays would have the same effect; and this would be further evidence in favour of similarity of chemical constituents in the ayapana and in melilot.

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(1) See: Abstract 41, *Bull.* Jan. 1911 and Abstracts 1364, 1365, 1366 *Bull.* May, 1911. [*Ed.*].

PERRIRAZ. **An Instance of Mutation in Cyclamen.** (Un cas de Mutation chez le Cyclamen). — *Bulletin de la Société Vaudoise des Sciences naturelles*, Vol. XLII, N. 173, p. XXV. Lausanne, Juin 1911. 2076

« Instances of typical mutation are known to be comparatively rare. De Vries recorded and obtained some (see « *Espèces et Variétés* »). Five years ago, Mr. Walter obtained, in a seed-plot of Persian cyclamens, a specimen in which the flowers were erect instead of drooping. The completely altered appearance of the plant induced him to make a special cultivation of it for sale. As there was only one plant of this description, he pollinated its flowers with the pollen of normal varieties of various hues. The results obtained are noticeable for the variations in the general shape of the plant. The size of the flowers varies greatly, some attaining 14 cm. in diameter; the variety of colour is surprising ; the shape and size of the leaves and their spots is very varied; the number of corollas attains a high figure. These features combine to make a valuable horticultural plant. Switzerland

« Theoretically, the case is interesting ; it is a typical mutation. It occurred in an ordinary seed-plot, and investigations made about the parent-plants reveal no characteristics which could account for such a result. According to De Vries, mutation is hereditary. Is it so in this case ? We have seen that pollination was effected with the pollen of ordinary drooping flowers ; one would therefore have expected that at least as many of the plants would have bent flowers as upright. This would have been the case had the gametes been of equal strength. Of 83 plants obtained in the seed-plot the first year, 61 reproduced the characteristics of the mother plant. This is a remarkable case of mutation between hybrids of varieties, in which the hereditary percentage is high; it has now fallen to 50 %, though pollination has always been made with the pollen of bent flowers. The experiments will continue for some years more.

The Creation of Varieties of Cotton, Cowpea, Timothy-Grass, Flax, Melons, and Asparagus Resistant to Disease. See Abstract 2288 2077

E. KAYSER. **The Influence of Humates on Micro-organisms.** (Influence des Humates sur les micro-organismes). — *C. R. de l'Acad. des Sc.*, T. 152, N. 26, pp. 1871-1873. Paris, 26 Juin 1911. 2078

Humates in the proportion of 2 per 1000 were added to some peptonised and sugared broth, while some was left without humates; all was sown with the « fat » ferments (*ferments gras*) of cider. The France

addition of humate hastened the disappearance of the sugar, and had no effect on the cider ferment. It would seem that the humate is a food to the ferments of cider, for the results obtained are comparable to those which the writer noted on adding to sugared must dead yeast, containing matter which the living yeast can assimilate.

2079 LEMOIGNE. **Denitrifying Bacteria of Filtering Sewage Beds** (Bactéries Dénitrifiantes des Lits Percolateurs). — *C. R. de l'Acad. des Sc.*, T. 152, N. 26, pp. 1873-1875. Paris, 26 Juin 1911.

France

Denitrification is often mentioned as occurring in the biological purification of sewage. Some writers, amongst others W. Mair, attribute this denitrification to the lack of aeration of the bacterial beds: the organisms, according to this hypothesis, reduce the nitric nitrogen to utilize its oxygen. On the other hand, Mr. Mazé has shown that they reduce nitric acid, to utilise its nitrogen (1).

These investigations show that aeration favours denitrification by *B. subtilis* and by another bacillus similar to *B. subtilis*; both bacilli are plentiful in the filtering beds, in which they rapidly destroy nitric acid. Undoubtedly these denitrifying bacteria, which abound, play an important part in this process.

When it is borne in mind that recent research has shown that nitrification, under normal conditions, takes place in the presence of organic matter, one is forced to the conclusion that the two phenomena of nitrification and denitrification may occur simultaneously. But the reduction of nitric nitrogen requires the presence of organic matter; the destruction therefore of organic matter arrests denitrification, leaving the field free to the inverse action, which then manifests itself in its full intensity.

2080 F. SCHINDLER. **Six Years' Experience in Inoculation with Nitragin and Remarks on Green Manure.** (Sechsjährige Versuche mit Nitraginimpfung nebst Beiträgen zur Gründüngungsfrage). — *Mitteilung aus dem Versuchsgarten der Lehrkanzel für Landwirtschaft an der K. K. deutschen technischen Hochschule in Brünn*) - *Zeitschrift für das Landwirtschaftliche Versuchswesen in Oesterreich*, XIV. J., H. 6., pp. 829-865. Wien, Juni, 1911.

Austria

Experiments were made on coarse sandy soil, very poor in humus and nitrogenous matter, and free from all leguminous nodule-bacteria.

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(1) Compare Abstr. 2073, *Bulletin* July 1911. (*Ed.*),

The soil was originally grass land; and after breaking up had been treated the first year with farm-yard manure, and with 143 kgs. of soluble phosphoric pentoxide as superphosphate, and 93 kg. of potash as kainit, per hectare. The second year the soil received 60 kg. of phosphoric pentoxide and 30 kg. of potash per hectare. Pure bacterial cultures from the agricultural Botanical Institute of Munich were used for the inoculations.

The results obtained are shown in the following table :

Year	Plant.	Plots square metres	Total yield in grams of dry matter without inoculation	Total yield in grams of dry matter with inoculation	Non-inoculated yield = 100 Inoculated yield
1904	Yellow lupins	10.92	39.75	635.4	1600
»	Blue »	»	109.4	207.2	189
1905	Yellow »	7.28	488.0	614.0	130
1906	White »	10.92	8 628.0	10 088.5	117
»	Blue »	7.28	953.0	1 184.0	124
»	Serradella . .	»	662.0	1 560.0	236
1907	White lupins.	10.92	7 188.0	8 989.0	125
»	Serradella . .	7.28	2 745.0	4 543.0	113
1908	White lupins.	10.92	4 041.0	4 738.0	117
»	Serradella . .	7.28	4 597.0	5 145.0	113
1909	White lupins.	10.92	6 498.0	8 440.0	128

The writer thinks that the efficacy of green manuring can only be determined as the result of many comparative observations, extending over a series of years. Special considerations must be given to the question whether the right method has been followed: *i. e.*, whether the Leguminosae best suited to the physical and economic conditions of the locality have been selected: whether the green manure-crop should be grown along with the principal crop, or only after it has been harvested: whether the most suitable method of cultivation has been fixed on: whether the biological properties of the plants used for green manure are adequately known: and, lastly, whether the technical knowledge of green manuring is sufficient.

The influence which green manures exert over the whole organization of the farm, in connection with the rotation of crops and the amount of labour required, must also be borne in mind. The question of the returns obtained must likewise be studied, on the basis of a knowledge of local conditions and exact accounts.

MATHEY. **Hail Storms** (Note sur les Orages à Grêle). — *Bulletin des Séances de la Soc. Nat. d'Agric. de France.* Tome LXXI, No. 6, pp. 463-467. Paris, Juin, 1911.

The writer thinks the documents of the Meteorological Stations and Insurance Companies should be used in France for drawing up a map of the kind devised for Switzerland by Dr. Maurer.

By this means, he says, the centres of the formation of storms (ponds, marshes, bare table-lands, etc) would be determined, and at the same time favourable localities could be selected on the storm tracks for the formation of forest screens (*rideaux boisés*), to act as living barriers.

The reafforestation of the spots where cloud centres form, or at least of their immediate neighbourhood, would probably be attended with good results; as forests, which appear to cause the prevention of hail when already formed, must, *a fortiori*, be able to hinder its formation.

The Resistance of Plants to Wind. *Achatina fulica*, a Cotton Pest in Mauritius — *Agric. News.*, Vol. X, No. 238, p. 185. Barbados, June 10, 1911.

The *Bulletin Agricole*, of Mauritius, for Feb. 1911, mentions the effect of a hurricane upon various plants in the island.

The cocoa-nut palms showed much power of resistance; the leaves of the tamarind trees were scorched, but soon grew again. But in an area where much harm was done to plants of every kind, several acres of cotton were completely destroyed, though generally this crop proved its power of resistance to high winds.

Reference is also made to a large snail, *Achatina fulica*, which is a cotton pest in Mauritius, though in Ceylon, in 1910 (1), it showed itself a scavenger rather than a plant foe.

A. D. HALL and N. H. J. MILLER. **On the Absorption of Ammonia from the Atmosphere.** — *The Journal of Agricultural Science*, Vol. IV, Part. 1, pp. 56-68. Cambridge, May 1911.

The most trustworthy determinations of the amount of ammonia in the atmosphere are the long series that have been carried out by Lévy at Montsouris and they agree with other determinations by

(1) See Abstract 1076, this *Bulletin*. March 1911. (*Ed*).

Ville, Schloesing and by Müntz and Aubin, showing only from 0.01 to 0.02 of nitrogen as ammonia per million of air, even in Paris; with a still smaller proportion in the air of the country. This small proportion of ammonia may reach the soil in two ways; it is dissolved out by the rain; it may be absorbed directly by the soil. The total amount brought down per acre and per annum by the rain appears to be tolerably constant for ordinary country air, despite variations in the rainfall; but it rises considerably in the neighbourhood of towns(1). Observations as yet unpublished indicate that a much smaller total amount of ammonia is brought down by the rain falling on the extreme western seaboard of Scotland, where the air may be supposed to have received a minimum of contanimation from habitations or contact with the land surface.

The question of whether the soil does gain any ammonia from the atmosphere, by direct absorption, is one of considerable importance in any attempts to construct a balance sheet for the nitrogen received by, and removed from, an experimental plot, over any length of time; and the investigations here reported were initiated with the view of obtaining further light upon the problem. In the first place, attempts were made to ascertain if ordinary arable soil either gave up or absorbed any appreciable amount of ammonia, when a current of air from the open, and therefore containing some ammonia, was passed over it. But the results proved entirely negative. These experiments however, were conducted on much too small a scale to admit of any conclusions.

Other investigators have attempted to measure the maximum amount of ammonia which might be absorbed from the atmosphere by exposing dishes of acid for a considerable length of time, and then neutralising and distilling over the ammonia for determination. It was decided by the writers to repeat these determinations, exposing the dishes under such varying conditions as would give some indication of the source of ammonia. Four pairs of dishes of glazed earthenware, containing 50 cc. of normal sulphuric acid, 130 cc. of distilled water and 70 cc. of glycerol, to prevent rapid evaporation, were exposed in pairs, one dish at about 5 centimetres from the ground, the upper one at about 115 centimetres. The dishes, about 3 cm. deep, having a surface of 550 square centimetres, were protected from rain by large sheets of glass, fixed at a slight angle above them, and covered by a sheet of brass wire gauze of 100 meshes to the inch, to keep out insects, though not entirely excluding dust.

(1) See, N. H. J. Miller, *Journal Agric. Sci.* 1905 I. 280.

The following table shows the total absorption for ten months of each year, excluding April and May 1909 and March and April 1910, the two months following the applications of the manures on Broadbalk field.

Total Nitrogen as Ammonia absorbed per dish in 10 *months.* (*mg.*).

	Broadbalk Plot 7		Broadbalk Plot 12		Park		Laboratory Lawn	
	Upper mg.	Lower mg.	Upper mg.	Lower mg.	Upper mg.	Lower mg.	Upper mg.	Lower mg.
1908-1909	4.163	3.471	3.845	2.964	3.521	2.990	7.506	4.103
1909-1910	5.032	4.923	5.323	4.222	4.333	4.168	8.746	4.933

It will be seen that the arable land gives slightly higher results than the Park grass land, and that both are distinctly below the results on the laboratory lawn. These results are not consistent with an absorption of the ammonia by the soil, because one must suppose that the bare arable soil would have a more powerful absorbing effect upon the air above it than the grass land. The small difference between the grass and arable land is best explained by the difference in exposure, which results in a much more vigorous air circulation above the arable field; and this conclusion is strengthened by the fact that the greater absorption above the arable land is much more marked for the upper dishes than for the lower. The dishes on the laboratory lawn show by far the highest figures, due doubtless to the greater contamination of the air by the chimneys that are near.

The surprising feature about these results is the small magnitude of the annual absorption per acre. The highest average result for the two years is only 1.533 pounds of nitrogen per acre (1.718 kg. per hectare), absorbed by the lower dish over Broadbalk field, the upper dish near the laboratory giving slightly lower figures (1). Even assuming the soil is as effective an absorbing agent as the sulphuric acid in these experiments, the maximum absorption per annum amounts to less than a pound per acre, a quantity that would be negligible in any estimates of the gains and losses of nitrogen on a given piece of land under any method of treatment. The main object of the investigation is so attained and it can be concluded with some confidence that whether the soil normally gives off or absorbs ammonia the total amount of absorption is very small.

(1) These results include the months following manuring. (*Ed.*).

S. Bogdanov. **Effects of Cultivation on the Physical Properties of Sandy Soils.** — (Vlianiie Kulturi na Fisiceskaia Svoistva odnoi pestcianoi Potcvi). — *Khosiaistvo* (the Home), VI G.; N. 15, pp. 467—476. Kiev, 21 Aprielia, 1911. 2084

This is an account of research work and experiments made to determine the effects of cultivation on the physical properties of poor and sandy soils, in the district of Radomischl (Government of Kiev) Russia: Kiev

Three different kinds of soil were examined, which had been subjected to more or less intensive cultivation over a long series of years.

I. Land left for 12 years without cultivation, as natural pasture.

II. Land on which lupins were grown, manured with wood-ashes ; and barley or rye manured with bone-powder.

III. Land regularly dressed with farm-yard manure and wood-ashes, and afterwards used for market gardening. This is the richest and best cultivated.

When the absolute and relative specific gravity of these soils has been determined, the relative porousness of the lands can be calculated (1).

The porousness decreases as the intensity of the cultivation increases, as is shown by the following table.

Samples of soil	I	II	III
Absolute specific gravity	3.0	2.9	2.4
Relative » »	1.5	1.5	1.4
Porousness %	50.0	48.3	41.7

Other researches were made to determine the following properties:

1. *Maximum degree of hygroscopicity*: Quantity of aqueous vapour absorbed by the soil from an almst saturated atmosphere:

2. *Water not utilised by crops*: Quantity of water absorbed by the soil, which the plants cannot make use of.

3. *Absolute absorbant capacity*: Quantity of water contained in the soil, held *by* capillary action.

4. *Water utilised by crops* : Quantity of water in the soil which the plants can make use of.

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(1) Porousness is calculated by the following formula: $C = \frac{G - G_1}{G}$ in which C = porousness; G = absolute specific gravity; G_1 = relative specific gravity. By multiplying this ratio by 100 the % of porousness is ascertained. (*Ed.*).

The results are summarised in the following table:

Samples of soils	I	II	III
Maximum degree of hygroscopicity	0.7 %	1.1 %	1.9 %
Water utilised by crops.	1.4 »	2.2 »	3.8 »
Absolute absorbant capacity . . .	7.9 »	10.7 »	13.2 »
Water utilised by crops.	6.5 »	8.5 »	9.4 »

It is thus seen that hygroscopicity and absorbant capacity increase with the increase of organic matter. Intensive cultivation and the use of manures thus afford a practical means for permanent improvement of the physical nature of sandy soils and for better utilising soil-water.

2085

Irrigation Projects in Spain. (La construcción des obras hidràulicas). — *España Economica y Financiera*, N. 955, pp. 410—411. Madrid, 24 de Junio, de 1911.

Spain

For the last 10 years, the area of irrigated lands in Spain has amounted to about 1 300 000 hectares (3 200 000 acres), of which one quarter is only intermittently irrigated. These 1 300 000 ha. are inadequate to the agricultural needs of Spain ; the Government has therefore presented to the Cortes a Bill for a grant of 110 million pesetas, in 5 annual instalments, for irrigation works.

Of this sum, about 45 millions will be spent on finishing works already in hand; 59 millions will be spent on new works, canals, dams, and irrigation ; and 5 millions will be used to regulate the course of the Mançanarès.

2086

Irrigation in the Upper Swat Valley, India. — *The Times* (Engineering Supplement), London, May 24, 1911, p. 79.

India: N. W. Provinces

One of the boldest irrigation schemes ever conceived is now being carried out in the Upper Swat valley on the North-West Frontier of India. To Sir John Denton belongs the credit of devising a scheme which will add nearly 400 000 acres to the area annually irrigated by the Swat River canals. He found there were only two ways of adding materially to the area already irrigated. The first scheme was to head up the Swat River by a masonry dam, three miles above Abazai; the second to take off a canal at Chakdara, 26 miles above Abazai, and, if possible, lead it through the hills to the high level ground on the southern side of the Malakand range. Surveys having shown that the Malakand Pass was not too wide to be tunnelled, Sir

John Denton decided for this bolder scheme, and in due course the Government of India sanctioned it. The project is unique in that for no less than 17 miles the canal, including the headworks at Chakdara, the tunnel, and the alignment from the tunnel to Dargai, lies in Toibal, territory beyond the border of British India; and it is proposed to permit the tribesmen to irrigate their lands on the same terms as are granted to British Indian subjects.

C. E. Tait. **The Use of Underground Water for Irrigation at Pomona California.** — *U. S. Dept. of Agr., Office of Expt. Stations, Bulletin* 236, pp. 1-100. Washington, May 9, 1911. **2087**

The Pomona Valley is typical of localities in the Citrus belt of Southern California, where water has a high agricultural value, but can be secured only at high cost. Much of the water is pumped; and there is no other section where water is used more economically, or where greater effort is made to improve methods of development, distribution and application. **United States: California**

This report describes the problems confronting the irrigators, the methods employed and the progress made in the economical use of the water resources.

F. Scurti & G. Tommasi. **Influence of Fertilisers on the Constituents of Seeds.** (Influenza degli elementi fertilizzanti sulle variazioni dei principii attivi dei semi) *Annali della R. Stazione Chimico-Agraria Sperimentale di Roma*, S. II, V. IV, 1910, pp. 303-311. Roma, 1911. **2088**

Experiments were made on haricot beans: *Phaseolus vulgaris albus, Ph. v. niger, Ph. multiflorus atrovariegatus, Ph. m. vulgaris albus*, grown in pots and the open field, at the Experimental Agricultural Station of Rome. **Italy: Rome**

The comparative manuring was as follows:

1. Without manure;
2. With mineral superphosphate;
3. „ sodium nitrate;
4. „ superphosphate and sodium nitrate;
5. „ farm-yard manure.

The results lead to the following conclusions:

I. Haricot beans richest in nitrogenous non-proteid matter are obtained from the soil poorest in fertilisers.

II. Superphosphates lower the non-proteid nitrogenous content of the seed.

III. Nitrogenous fertilisers lower, yet more noticeably, the percentage of non-proteid nitrogenous matter: reducing it to nearly ⅓ of that obtained in unmanured soil.

IV. The reduction of non-proteid nitrogenous substances would therefore seem due to nitric nitrogen, which favours the formation of proteid substances.

V. Thus, the nitrogen of fertilisers would exercise a specific effect on crops.

This would also explain why in the cultivation of medicinal plants, nitrogenous fertilisers give products less rich in alkaloids.

2089 A. MUNTZ and E. MAINE. **Considerations on the Utilization of Sewage for Agriculture**, (Considerations sur l'utilisation agricole des Eaux d'Egouts). — *C. R. de l'Acad. des Sciences*, T. 152, N. 26, pp. 1814-1818. Paris, 26 Juin 1911.

The purification of sewage by means of filter beds seems to have made people forget the benefits of sewage-irrigation.

France The writers have resumed their studies on the influence of sewage water on the fertilisation of land: considering, not only the fertilising elements which it contains, but also the water as a means of irrigation. The heavy expense incurred in bringing water to the land from sources devoid of fertilising substances is well known. It can be stated without hesitation that if ordinary irrigation water pays for the expense of bringing it to the land, this would be still truer of sewage charged with fertilizing substances.

It would therefore be reasonable and practical to do for sewage what has been done for irrigation water: to bring it from a distance to land sufficiently extensive to make use of it for crops whilst at the same time purifying the sewage.

Eight months of continuous observations carried on with the sewage of Paris showed that it averaged per cubic metre:

Ammoniacal nitrogen	gr.	21.61
Organic nitrogen in solution	»	7.66
» » suspension	»	25.85
Nitric nitrogen	»	0.73
Total nitrogen	gr.	55.85
Phosphoric acid	gr.	12.00
Potash	»	45.95
Lime	»	277.00
Magnesia	»	104.40

If these substances be valued at the average price they realise in the form of ordinary fertilisers, it will be seen that Paris sewage water contains, per cubic metre, fr. 0. 105 (about 1 *d*) of fertilising substances. The farmer generally pays about fr. 0.0025 per cubic metre for the pure water brought to his land. Therefore sewage water would be worth 40 times more than ordinary irrigation water. The economic possibility of conveying sewage water to a great distance is thus worth considering.

During vegetation, the plant draws from the sewage water which saturates the soil the fertilising elements it requires. But, during the winter, vegetation is at a standstill; and drainage carries away a part of the fertilising substances.

Careful observations made during 7 months on lands irrigated with sewage, under the usual conditions prevailing in the fields at Achères and Gennevilliers, near Paris, with 40 000 cubic metres per hectare (571 000 cub ft. per acre) and per year, gave the following results, calculated per hectare and per year :

		Brought by the sewage	Carried away by drainage	Residue left to the soil
Nitrogen	kg.	2 336.2	1 762.4	201.8 (1)
Phosphoric acid .	»	496.2	5.2	491.0
Potash	»	1 924.0	336.6	1 587.4
Lime	»	15 780.9	8 479.4	7 301.5
Magnesia	»	4 371.8	294.5	4 077.3

Other investigations made by the writers determine the right quantities of water for irrigating, suited to the several soils and the different crops. Here are some of the data resulting from these enquiries:

A permanent meadow, producing 12 000 kg. (11.8 tons) of hay per hectare (2.47 acres) uses 155 kg. (341lb.) of nitrogen, 42 kg. (92lb.) of phosphoric acid, 192 kg. (423lb.) of potash. To obtain this amount of nitrogen, 3000 cubic metres (106 000 cub. ft.) of sewage would be required, 3400 (120 000 cub. ft.) for the phosphoric acid and 4200 (148 000 cub. ft.) for the potash.

By irrigating such a meadow with from 4000 to 5000 cubic metres (140 000 to 176 000 c. ft.) of sewage, given in 8 or 10 instalments during the growing season, the needs of the crops would be supplied, both as regards the quantity of water and of fertilising substances required. When only limited areas are available there is therefore an enormous waste of nutritive substances; which, if spread over an area ten times as large, would increase its productive capacity in a like degree.

(1) This is the figure given in the original; it ought to be kgr. 573.8 (*Ed.*).

2090 L. CHAPTAL. **Manganese Chloride in the Treatment of Night-Soil** (Le Chlorure de Manganèse dans le traitement des Vidanges). — *Le Progrés agricole et vitic.*, 28è An., N. 25, pp. 778-782. Montpellier, 18 Juin 1911.

Night-soil used on farms as manure has the following defects:

1. It has a disagreeable smell.

France 2. It gives off dangerous gases, which may form explosive mixtures (methane, sulphuretted hydrogen), when mixed with the air in certain proportions.

3. It gives off ammonia and carbonate of ammonia, causing great loss of nitrogen.

4. It contains myriads of disease germs (typhoid, cholera, etc.), eggs of intestinal parasites etc.

It has been suggested that these defects could be overcome by adding to the night-soil manganese chloride, the residuum left when preparing chlorine by Scheele's method; this chloride, or muriates, is obtainable as a solution containing:

Manganese chloride	20	to	25 %
Free hydrochloric acid	5	»	8 «
Ferric chloride	5	»	6 »
Barium chloride	1	»	2 »

This liquid reacting on night-soil, produces:

1. Transformation of ammonia, ammonium carbonate, and ammonium sulphohydrate into ammonium chloride, a stable compound.

2. Elimination of sulphuretted hydrogen.

Moreover manganese chloride is a strong antiseptic.

It should be borne in mind that the use of manganese chloride as a fertiliser has been shown by many experiments to increase the yield of crops (rice, oats, etc.) (1).

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(1) The disinfectant action of the residuum left over from the preparation of chlorine, namely manganese chloride, which is highly acid, is mainly due to the antiseptic action of the free hydrochloric acid. The use of free mineral acids as an effective, easy, and inexpensive means of disinfecting closets and excrementa, and for controlling pathogenic micro-organisms, in night-soil. has long been advised in Italy. See, ITALO GIGLIOLI, *Igiene antimicrobica*, Napoli, R. Marghieri, 1887, p. 509. (*Ed.*).

A New Green Manure for Ceylon and the West Indies : *Tephrosia candida*, a Leguminous Plant. — *The Agricultural News*, Vol. X, No. 32, p. 91. Barbados March 18, 1911. 2091

Seeds of a plant called " Boja Medelloa ", or *Tephrosia candida*, were received from Ceylon and distributed for trial last year (1910) among the various experiment stations in the West Indies. Subsequently the analysis of the plant was made. The figures given for the green plant were determined from partly withered leaves and stems, so that allowance must be made for this; the percentage of moisture is probably too low by about 20. In the following table the figures are expressed as percentages: **Barbados**

	Leaves		Stems	
	Green plant	Plant dried at 100° C.	Green plant	Plant dried at 100° C.
Moisture	54.53	—	14.06	—
Organic matter * .	42.86	94.27	82.37	95.85
Ash	2.61	5.73	3.57	4.15
* Containing nitrogen	2.03	4.47	1.71	1.99

The analysis of the ash shows that this contains the following amounts for the leaves and the stems: lime 17.69 and 14.48 per cent; potash 21.47 and 32.89 per cent; phosphoric acid 8.10 and 11.00 per cent.

Every 1000 lbs. of fresh green manure from the Tephosia plant supplies an equivalent, in nitrogen, phosphoric acid and potash, to about 400 lbs. of castor cake, 10lbs. of bone meal, and a similar amount of sulphate of potash, respectively.

The figures conpare very favourably with similar quantities of other green manures; and it is considered that, with a reasonable yield per acre, this leguminous plant should prove a very valuable green manure.

B. Schulze. **The Action of Nitrites in Manures in Pot- and Field Cultures.** (Die Leistung des Nitrits bei Vegetations und Feldversuchen. *Mitteilung aus der agricultur-chemischen Versuchsstation Breslau*). — *Fühling's Landwirtschaftliche Zeitung*, 66. J., 10. H. pp. 346-351. Stuttgart, 15 Mai 1911. 2092

The preparation of nitrates by means of atmospheric nitrogen may give rise to products containing nitrites. Experiments made in pots have so far shown that the presence of nitrites, though it delays the **Germany : Silesia : Breslau**

germination of the seeds, does no appreciable injury to the subsequent development of the plant. The writer's experience confirms this in the case of pot-cultures.

But he obtained very different results when experimenting on plants in the open field. These experiments were made on 12 plots which had had no nitrogenous manure for 4 years. In 1910, they were manured with 4 kgs. of superphosphate and 2 kgs. of potash salts at 40 % per are (3cwt. 21 lbs. and 1cwt. 66 lbs. per acre); and they were sown with oats in drills. Then three lots were left without nitrogenous manure, three were treated with 1.5 kgs. (1cwt. 22 lbs.) of Norwegian nitrates, three with 0.99 kg. (88lbs.) of nitrite of lime, and three with a mixture of 0.75 kg. (66lbs.) of Norwegian nitrate and 0.50 kg. (44lbs.) of nitrite of lime; that is to say that all received the same amount of nitrogen, *viz* .0.172 kgs. per are (15.4lbs. per acre).

The yields obtained respectively were as follows :

	Grain kgs. per are	Straw kgs. per are	Grain cwt. per acre	Straw cwt. per acre	Nitrogen utilised, %
Without nitrogenous manure . . .	14.45	23.45	11.50	18.66	—
Norwegian nitrates	19.79	27.95	15.76	22.25	34
Nitrite of lime	15.33	22.33	12.20	17.77	—
Norwegian nitrate and nitrite . . .	18.00	24.17	14.32	19.24	11

Other experiments, also in the open field, gave the following results.

	Grain kgs. per are	Straw kgs. per are	Grain cwt. per acre	Straw cwt. per acre
Rye with nitrate of lime. . .	30.4	80.3	24.19	63.91
» » nitrite » . . .	28.0	63.5	22.29	50.55
Wheat with nitrate of lime .	31.0	68.2	24.67	54.29
» » nitrite » » .	29.0	73.0	23.08	58.11
Barley with Chili nitrate. . .	33.7	45.3	26.82	36.06
» » nitrate of lime .	31.1	40.4	24.75	32.15
» » nitrite » » .	29.3	41.7	23.32	33.15

All these results show that nitrites considerably reduce the yield, especially the yield of grain. Moreover, the growth of the rye was greatly retarded and the leaves turned red.

Perhaps better results would be obtained with soils lighter and richer in nitrogen than those used for these experiments. But, so far, the results seem to show that it is inadvisable to use nitrites in the open field. It is therefore desirable that nitrogenous fertilizers obtained by the oxidation of atmospheric nitrogen should contain only nitrates.

L. VUAFLART. **Detection and Determination of the Quantity of Cyanamide in other Fertilizers.** (Recherche et dosage de la Cyanamide en presence d'autres matières fertilisantes.) *Annales des falsifications*, IV An., N. 32, pp. 321-324. — Paris, Juin, 1911. 2093

Cyanamide or lime-nitrogen is now introduced into certain compound fertilizers, and the chemist may have to search for it qualitatively and quantitatively.

The characteristics of cyanamide, which are detected qualitatively in more or less modified forms, owing to the presence of other fertilizers are the following: France

1) A smell like that of garlic, due to the action of atmospheric moisture on traces of calcium carbide.

2) Strongly alkaline reaction.

3) Water treatment leaves an abundant black residuum.

4) An aqueous solution gives a yellow precipitate with silver nitrate.

In the inverse case, when an organic fertilizer, such as dried blood, is sought for in cyanamide, sulphuric acid is a valuable test. When added cold, the acid turns brown after a few minutes, if organic matter is present. The fertilizer can also be treated with diluted hydrochloric acid, cold; cyanamide leaves a black carbonaceous residue, whereas organic fertilizers remain unchanged.

In quantitative analysis, the separation of the cyanamide in the form of a silver compound, then the determination of the amount of silver in this compound by means of ammonium sulpho-cyanide, is an easy method. The article describes the technique of the analytical process.

HITIER. **Phosphatic Fertilizers and Superphosphates.** (Engrais Phosphatés et Superphosphates). — *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*, 10e. An., T. 115, N. 6, pp. 848-855. Juin, 1911. 2094

The following information on the consumption and production of superphosphates in France is taken by the writer from a report by Mr. Stahl on the question of superphosphates.

There are in France 80 manufacturers of superphosphates with over 100 factories distributed throughout the country, with an annual output of about 1 600 000 metric tons. As about 100 000 tons are exported, it would appear that France consumes annually 1 500 000 tons of superphosphates. France

In 1910, the world's demand of superphosphates amounted to about 10 million tons; the phosphates required for this amount are supplied by several countries in the following proportions:

North of France and Belgium . .	500 000	tons
North America	2 200 000	»
Algeria and Tunis	1 600 000	»
Australasia and other countries. .	800 000	»
	5 100 000	tons

The phosphatic chalk of the Somme (France) contains about 50 % of phosphate; the chalk is sold as a dry powder, per unit of phosphate, on trucks at the pits; the price has fluctuated from fr. 0.37 in 1906 to 0.51 in 1907. It is now worth fr. 0.40, or about 20 francs per ton.

The American phosphates are delivered in hard blocks; they contain, according to the places whence they come, 68 %, 77 % or 80 % of phosphate. They are sold per unit of phosphate f. o. b. the import harbour; the 77 % quality was worth fr. 0.98 in 1905, and fr. 1.02 in 1907; it is now worth about 55 fr. per ton. To this must be added the cost of unloading, carriage to the factory, and crushing, which amounts to about 6 fr. per 1000 kgs.

The blocks of African phosphates are softer. They are also sold f. o. b. at the export or import harbours. Their average phosphate content is 60 %. The average price is fr. 0.55 per unit, or 33 fr. per ton. The cost of crushing is only about half of that incurred for American phosphates.

Australasian phosphates are harder than American; they are exceptionally rich and pure, the phosphate content being as high as 83 and even 85 %. They are sold f. o. b. import ports at about 72 fr. per ton. The price of superphosphates has risen of late owing to the increased cost of raw phosphates and pyrites.

There is only one important pyrites mine in France, at Saint-Bel near Lyons, from which 240 000 to 250 000 tons are quarried each year. The French demand amounts to about 700 000 tons per year.

Pyrites are supplied to the French market by the Spanish, Portuguese, Greek, Turkish, and Norwegian mines.

ERDMANN. **Possible Sources of Potash outside Germany.** — *The Engineering and Mining Journal,* New York, May 27, 1911, pp. 1044. 2095

The writer reviews the possible sources of potash salts outside of Germany. He dismisses the salt deposits of France, Austria, the Caspian region and those of Tibet, because the percentage of potassium chloride in all those deposits is too small for profitable extraction or exploitation. Mexico. Chile

In Lower California there is a deposit supposed to contain at least 200 000 000 tons of potassium chloride, which would cover the present needs for manure for 200 years to come. This has resulted from the drying up of the end of the Gulf of California, separated ages ago by alluvial deposits from the Colorado river and from the remainder of the Gulf. It is not to be inferred, however, that this mass of potash salts is to be found in a state ready for exploitation.

Chile might sooner attain to a moderate increase of the potassium industry. To the extent that the saltpeter deposits of Chile are worked and are nearing their exhaustion, it becomes advantageous to use the capital invested there to open new auxiliaries, and thus to make use of the potassium deposits which exist in the province of Tarapaca and on the Huasco lake, in the province of Atacama.

Consequently no considerable foreign competition threatens the German potassium industry in the near future, unless foreign countries are forced to supply the demand in a different way, as a result of a sudden and large increase of prices.

ALBAN (Br. Cons.). **Chemical Fertilizers in Egypt.** — *The Board of Trade Journal,* No. 763, p. 58. London, July 13, 1911. 2096

There was last year a large increase in Egypt in the imports of chemical fertilizers, due to the increasing demand for them for intensive cultivation, chiefly of field crops, and to some extent of vegetables and fruit. Egypt

Of a total of 35 559 tons, imported into Egypt in 1910, of which 50 per cent. came from Belgium, 33 per cent. from Chile and 14 per cent from the United Kingdom, there were 30 505 tons of nitrate of soda, 3 318 tons of superphosphates, 1 660 tons of sulphate of ammonia and 76 tons of miscellaneous manures. There is also an increasing demand for potassic manures for use on poor lands.

The British share of the chemical manures imported in 1910 is four times as much as in 1909, and constitutes one-seventh of a total that has increased by 66 per cent.

2097 **Repression of Frauds in the Manure Trade in France.** (La Répression des Fraudes dans le commerce des Engrais en France). — *Bulletin International de la Répression des Fraudes*, année IV, N. 32, pp. 185-198. Paris, Juin 1911.

France

The President of the French Republic, on a report by the Minister of Agriculture, has regulated, by a decree of May 3, 1911, the application of the Law of February 4, 1888, for the repression of frauds in the fertilizer trade.

The decree prescribes the information which the vendor must give in the bill of sale on the nature, composition, and cost per kg. of fertilising matter.

This decree also lays down the way in which samples are to be taken and the official reports of offences against the law of February 4, 1888, are to be drawn up, and expert examinations on both sides made.

The Minister of Agriculture has made known, in a decree of May 15 1911, and in a circular to the inspectors of frauds, the precautions to be taken in sampling, the way in which the official report is to be drawn up, and the information to be given on the labels.

2098 E. Le Men. **Bourdiol's Method of Cultivating Cereals on Arid Lands.** (Nouvelle méthode de culture des céréales en régions séches). — *Bulletin des Séances de la Soc. Nat. d'Agric. de France.* Tome LXXI, N. 6, pp. 469-504. Paris, Juin 1911.

The experiments and practical tests made by Mr. Ryff and Mr. Bourdiol make it possible to summarise as follows the practice of this new method of cultivation.

France. Algeria

In a suitable field, a furrow 8 to 10 cm. (3 to 4 in.) deep is turned. In it seed is sown broad-cast, care being taken to sow it about $\frac{1}{4}$ or $\frac{1}{5}$ thicker than usual. At a distance of 70 to 120 cm. (28 to 48 in.), generally 80 to 90 cm. (32 to 36 in.) from this first furrow, another is ploughed and seeded in like manner, and so forth. The field is thus divided into uncultivated strips of a certain width, separated by furrows from 15 to 20 cm. (6 to 8 in.) wide, which alone are sown. As soon as the rows of cereals are visible, and if the condition of the ground allows, the soil is slightly cultivated, or hoed, between the rows, with an ordinary plough or American hoe, according to the state of the ground and the degree of hardness. This

hoeing is to be repeated at least once a month in winter and without fail after each rain-fall, as soon as the surface dries and cracks.

This hoeing must be done neither too soon nor too late after the rain if the best results are to be had. In dry weather it should be done about every three weeks in March, April, May, and June, and at least twice during the summer after the harvest ; these two last hoeings should never be neglected. In this way the field will be hoed from 6 to 10 times during the whole course of the year.

1. *Specialities of the system.* — The crop only occupies a small proportion of the land. This method enables the plants to tiller well and the number of ears obtained per hectare is much higher than that formerly obtained. Besides, it is no longer necessary to fallow the land and the whole of the farm can be seeded each year. The frequent hoeings soon succeed in destroying completely all noxious weeds.

2. *Implements.* — By this system, the only implements required are an ordinary plough, which can trace a furrow 10 cm. deep, and a small American hoe.

3. *Preservation of the fertility of the soil without need of manures.* — The originator of this method, Mr. Bourdiol, applying to his system the ideas of Milton Whitney regarding fertilisers, thinks he can safely affirm that, by thus maintaining the moisture in the soil, a whole bacterial flora is obtained, which can destroy the toxins secreted by the plants, without its being necessary to use any manures to stimulate this destruction.

4. *Action of the sun and wind.* — Mr. Bourdiol has frequently recorded that the surface temperature of the soil was from 8° to 10° lower (than in ordinary fields) in the fields thus sown in rows widely apart. Evaporation is less considerable ; tillering, the development of the plants, and earing are better ; and premature yellowing or lodging is less likely to occur. Besides, if the furrows be drawn in the direction of the prevailing winds, or rather of the hot winds, so that these winds may circulate readily between the rows, the chances of scorching of the wheat are reduced.

5. *Harvest.* — The harvest is got in quicker and more readily supervised.

The writer has recorded his observations in the following table. (1)

YEARS	Crop	Yielding quintals per hectare							
		at Rivoli		at la Mina		at Clinchant		at Batna	
		(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
1906-1907	Wheat. .	19	4	»	»	»	»	»	»
	Barley. .	»	»	«	»	»	»	»	»
	Oats . .	19	6	»	»	»	»	»	»
1907-1908	Wheat. .	18	5	»	»	»	»	»	»
	Barley. .	»	»	»	»	»	»	»	»
	Oats . .	22	8	»	»	»	»	»	»
1908-1909	Wheat. .	20	4	8	4	»	»	»	»
	Barley. .	»	»	»	»	»	»	»	»
	Oats . .	17.5	4	15	5	»	»	»	»
1909-1910	Wheat. .	17	10	14	10	7	5	13	9
	Barley. .	»	»	»	»	»	»	22.5	16
	Oats . .	22	18	18.5	12	»	»	»	»

(1) = new method, — (2) = usual method.

(1) Compare Bourdiol's method of cultivating cereals with the system followed by Samuel Smith at Lois Weedon in Northamptonshire, from 1845 till after 1864.

See: SAMUEL SMITH, *Lois Weedon Husbandry*, and *A Word in Season to the Farmer, or How to Grow Wheat with Profit*, London, 1869; Mr. Samuel Smith's pamphlet went through 17 editions. See also a similar method followed at Messina: P. FREDA, *La Fillossera nell'Agro Messinese nel 1880*, Roma, 1881, p. 30. ITALO GIGLIOLI, *Chimica agraria campestre e silvana*, Napoli, 1902, p. 121. (*Ed.*).

Field Crops — Industrial Crops — Horticulture Arboriculture.

H. LONAY. **Belgian Wheats** (Les Blés Belges). — *Journal de la Société Royale Agricole de l'Est de la Belgique*, 62. An., N. 30, p. 147. Liège, 24 Juillet 1911. 2099

Belgian farmers now possess Belgian varieties of cereals, either native or acclimatised and selected in Belgium for several generations past with all requisite scientific severity. The results obtained at the Selection Station at Alleur (Ans) are equal to any obtained abroad. The three varieties of wheat which have been fixed at Alleur « *Rêve d'or* », « *Excelsior* », and « *Ralliance* » surpass any foreign wheat in the regularity of the shape of their ears and in high specific gravity. Belgium

« *Rêve d'or* » is the most remarkable : this variety is characterised by its compact ears, reddish grain, and white straw, which is of good average length and very resistant to lodging. Moreover, « *Rêve d'or* » is resistant to disease. The same may be said of the « *Ralliance* », which is exceedingly hardy. « *Excelsior* » is a native Belgian variety of wheat, considerably improved in the shape of the ear and the yield.

The Wheat Crop and Import Duties in Spain. (La producción triguera y el arancel). — *España Economica y Financiera*. A. XIX, N. 956, pp. 425-426. Madrid, 1º de Julio de 1911. 2100

The Spanish Government has announced its intention of placing an extra import duty of 2.50 pesetas (about 2s.) on foreign wheat. Circles interested in wheat have made studies to see whether this is advisable or not in the interests of Spanish production, as far as the yield obtained is concerned. Spain

The production of wheat rose from 25 582 041 quintals (2 518 000 tons) for the period 1882-1886, to 29 873 400 quintals (2 927 600 tons) from 1904 to 1908, *i. e.* an increase of 4 291 359 quintals, or 16.80 % (1).

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(1) The area planted to wheat in 1909 in Spain was 3 782 695 hectares (8 362 170 acres) with a yield of 39 218 885 metric quintals (3 861 138 tons). See *Statistique des superficies cultivées*, etc. *Essai d'Inventaire*, INSTITUT INTERNATIONAL D'AGRICULTURE. (*Ed.*).

As the population of Spain is 19 500 000, supposing each inhabitant to consume 182.50 kgs. per year, (about 400 lbs.) there is a shortage of 35 500 000 quintals (3 480 000 tons) of wheat, without taking into account the 5 000 000 quintals (490 000 tons) required for sowing. Moreover, the ratio between the growth of the population and the increase in the production of wheat is disproportionate, and to the disadvantage of the latter.

2101 NEUMANN. **The Year's Barley in Germany.** (Die ersten diesjährigen Braugersten). — *Zeitschrift für Spiritus Industrie*, XXIV. J., Nr. 31, pp. 383-384. Berlin, 3, August 1911.

The writer publishes the first results obtained for the present season at the Nitrogen Laboratory of the Institute for Distilling Industries of Berlin, with barley for brewing.

Germany

Barleys from	Water	Albuminoids	Weight of 1000 grains, in grams. air dried	dry matter	Sorting screen mm. 2.3	screen mm. 2.5	screen mm. 2.2	Impurities
	%	%						
Silesia	13.7	11.3	56.	48.4	87.8	11.6	0.6	—
Posen	13.9	9.3	49.6	42.7	67.2	29.	3.2	0.6
»	12.5	10.1	47.6	41.8	—	—	—	—
»	12.5	9.5	47.	41.1	—	—	—	—
Kujavia	14.6	10.5	48.2	41.2	50.6	40.2	6.6	2.6
»	12.7	11.1	49.4	43.1	58.4	37.2	4.2	0.2
Mark Brandeburg	13.0	11.9	49.6	43.2	51.2	42.2	5.8	0.8
Prussian Saxony	12.5	12.8	49.6	43.4	—	—	—	—
»	11.2	9.1	48.1	42.7	56.8	36.6	5.8	0.9
Palatinate . . .	11.8	9.4	44.3	39.1	25.4	51.5	18.2	4.9
Thuringia . . .	10.3	9.4	47.6	42.7	55.8	42.1	2.2	0.2

The colour shape and uniformity of the barley are, on the whole, satisfactory.

2102 G. JACOMETTI. **A Variety of Mountain Rye in the Piedmontese Alps.** (La segala di montagna). — *Annali della R. Accademia di Agricoltura di Torino*, Vol. LIII, 1910, pp. 727-736, fig. 1. Torino, 1911.

Italy : Piedmont

In the mountainous part of the district of Susa, in Piedmont, a variety of rye has long been grown, known as « Alpine » or « Mountain Rye », which is highly esteemed by the farmers of Savoy, Dauphiné and the Pyrenees. This variety yields over 19 quintals of grain per hectare (15.13 cwt. per acre) as against 12 quintals per hectare (9.46 cwt. per acre) which is the usual yield of rye in the plains.

Forty-three trials were made with this Alpine rye, on the initiative of some Piedmontese farmers with the help of the « *Consorzio Agrario cooperativo di Torino* ».

The following results were obtained :

1. Alpine rye grows more rapidly than ordinary rye, and develops more vigorously during, the first period, thus supplying more abundant and reliable pasturage in the autumn and winter.

2. It tillers more vigorously than other known varieties of rye, so that an appreciable saving can be made on the amount of seed required (about one half).

3. On poor, arid soils exposed to the wind, Alpine rye has yielded unexpected returns, the yield being a good third heavier than with ordinary rye.

4. On the other hand, when sown on very fertile, and, more especially, on moist lands, Alpine rye, which was luxuriant and superior to ordinary rye until the flowering period, afterwards rapidly deteriorated, giving a crop poor in quantity and quality.

5. Alpine rye, when grown in equal parts with ordinary rye, is successful even on very fertile land, provided the soil be not damp, nor subject to mists. The tendency of the Alpine rye to lodge is in this case counteracted by the more resistant qualities of the ordinary rye.

6. In the opinion of some farmers, Alpine rye in the second generation loses much of its productive capacity, the grain becomes shorter, and less plump and fine.

The writer concludes :

a) Alpine rye is a variety with a high yield, well suited to poor, dry lands exposed to the wind.

b) Mixed in equal parts with common rye it is suited to fertile lands, as long as they are neither damp nor subject to mists.

c) As the special qualities of Alpine rye cease, or diminish, after the second generation raised out of its original locality,the seed should be renewed every three years; and original seed should be procured, at least until farmers succeed in preventing the rapid deterioration of the variety by means of systematic selection.

J. W. T. Duvel & L. Duval. **The Shrinkage of Maize in Storage.** — *U. S. Department of Agriculture, Bur. of Plant Industry*, Circ. No 81, pp. 1-11 + fgs. 3. Washington, June 5, 1911. **2103**

United States

A series of special investigations begun in order to determine the amount of shrinkage, or loss, in weight occuring in shelled maize, contain-

ing various percentages of moisture, while stored in elevators or during transit in cars.

The experiment described was made with 500 bushels of shelled maize, stored on a 30 000 lb. scale (kg. 13 590); and was carried out in co-operation with the Baltimore and Ohio Railroad Co. and the Baltimore Chamber of Commerce. The shrinkage test extended over a period of 147 days, January 5 to June 1, 1910; during which time the corn was not « handled », except on May 14.

At the beginning of the test the average moisture content of the maize was 18.8 per cent. The average temperature of the corn and the temperature of the air was + 20 F. (- 6°. 6. C.).

The shrinkage in weight from January 5 to April 21, while the maize remained in good condition, was approximately 0.4 per cent. The shrinkage in weight from April 21 to May 14 was approximately 2.6 per cent., during which time the maize went « out of condition », becoming sour and hot, with a maximum temperature of 138° F. (58°.8 C.) on May 12. The shrinkage during the three elevations, on May 14, was 1.65 per cent., on the basis of the actual weight of corn in the hopper of the scale just previous to « handling ». The shrinkage during storage, from May 14 to June 1, after the maize was cooled to 55° F. (12°. 75. C.) by handling, was 2.6 per cent. The total shrinkage during the test was slightly more than 7 per cent.; while the natural shrinkage exclusive of the loss during the three elevations was approximately 5.6 per cent., calculated on the actual weight after making deductions for samples drawn for analyses. The rate of shrinkage, while the maize remained in good condition, was largely influenced by the weather conditions, and by the relative humidity and temperature of the atmosphere.

2104 **Rice Growing in Pampanga Province, Philippine Islands.** — *The Tropical Agriculturist*, Vol. XXXVI, No. 6, pp. 509-510. Colombo, June 1911.

Philippines : Pampanga

Rice, the bread of the Filipinos, has been grown in the Archipelago from time immemorial, and its cultivation is still one of the chief occupations of the natives in every province. Its production, which is yearly increasing, lessens the money sent to foreign ports (1).

(1) The chief products of the Philippine Islands are hemp, sugar, coffee, rice, copra, tobacco leaf, cigars, indigo. Agriculture, however, is still in a primitive condition, implements and methods being antiquated, farm animals scarce-

The province of Pangasiman leads all the other provinces in the Philippines in rice-production,

There are about one hundred and fifty varieties of rice in the islands; but the « mimis », « dinalaga », and « quiring-quiring » are varieties of greatest importance on the irrigated lowlands, where two crops are sometimes obtained in a year. The second, planted in January and reaped in March and April, is called « palacaya ». The « binundue » and « quinuayan » are esteemed varieties on the high unirrigated lands and hillsides.

The rice field is divided into small paddies, or in smaller ones called *libluban*. Each paddy is surrounded by low dikes, called *pilapil*, to keep the water on the farm equal. The paddies on an upland farm form terraces.

The land is ploughed and harrowed (with a harrow composed of a thorny bamboo, called *balsa*) at the beginning of the rainy season: May, June and July. Then the seed is sown broadcast. This is called *salbag-malañgi*. In some cases the grain is soaked in water and kept in the sack for three days to germinate. When so treated the seed is broadcasted in the soft mud of the field. This is done to protect the seed from rotting when the land is flooded. This flooding, which is called *palatac*, is done during the months of June, July, and August.

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labour and means of transport insufficient and capital wanting for the proper development of the soil. Towards the amelioration of agricultural conditions, the Bureau of Agriculture carries on investigations respecting the cultivation and improvement of the Philippine products. It has experimental farms, where improved varieties of tobacco, sugar, etc. are selected and grown, seeds, roots, and plants being distributed for general cultivation. Within the range of the Bureau are also the combating of destructive insects, the methods of curing tobacco, and the improvement of live-stock. The wide forests of valuable timber, gum and dye woods are under the supervision of the Forestry Bureau, which frames plans and rules for their protection and working.

The chief agricultural imports and exports in the fiscal year ending June 30, 1910, were:

Imports	Dollars	Exports	Dollars
Cotton goods	8 522 307	Hemp	17 404 922
Rice	5 321 962	Copra	9 153 951
Meat and dairy products	2 377 466	Sugar	7 040 690
Wheat flour	1 534 442	Tobacco leaf. . .	1 619 744
		Cigars	2 973 630

The Statesman's Year-Book 1911, pp. 557-558. (*Ed.*).

For transplanting, the land is also tilled while in a state of soft mud and is planted with young rice of six weeks (two or three plants in a hole), which is taken from small plots, or nurseries, called *pipamunlan*. Planting is done from early in June till late in October. Maturity comes four or five months later. With this kind of treatment the best crop is obtained.

After sowing and planting, no care is taken but to keep the paddies covered with water, cutting the last leaves. Harvest time begins in December and lasts until March. Thrashing is done either by men or caraboos (buffaloes).

Winnowing is done by placing the rice (about five litres at a time) on a flat basket and letting it fall little by little, so as to allow the chaff to be blown away by the wind.

2105 MARCEL DUBARD. **Some Varieties of Soy Bean.** (A propos de quelques variétés de Soja). — *L'Agriculture pratique des pays chauds*, IIe année, N. 98, pp. 422-426 Paris. Mai 1911.

France

There are several varieties of the soy bean; this article summarises the first observations made by the writer on fifteen such varieties grown in the *Jardin Colonial* at Paris. The exact characters of these varieties and the means of distinguishing them are not yet given.

The several varieties can be grouped in two classes, according to the character of their seeds :

1. Varieties the seeds of which are not yellow; and which are characterised by the smallness of the dried seed, its haricot shape, the cylindrical shaped radicle and the rapidity with which the bean swells in boiling water.

2. Varieties with yellow seeds, characterised by the round shape of the seeds when dry (which are larger than in other varieties), the flattened shape of the radicle, the less rapid swelling in boiling water and the firmness of the tissues of the embryo.

To this second category belong the varieties « Akasaya », « Gowari », « Nakade », Juninzuki » of Japan etc. The « Dozan » from Japan, the « Soy » of Laos and those Soys the seed of which is not yellow, belong to the first variety.

2106 C. J. BRAND. **Grimm Alfalfa, a Cold-resisting Lucerne, and its Utilisation in the Northwest of the United States.** — *U. S. Dept. of Agric., Bureau of Plant Industry, Bulletin* 209, pp. 66, pls. 2. Washington, 27 May, 1911.

United States

There are some forms of *Medicago*, known as " Variegated Alfalfa ", which are distinguished by great resistance to cold.

They have probably originated from natural crosses between *Medicago sativa*, with blue flowers, and *M. falcata*, with yellow flowers, which is found wild over the whole of Eurasia.

Among these variegated Alfalfas, "Grimm" Alfalfa takes the first place; it is already successfully grown in Germany and some parts of North America.

It is distinguished by a large percentage of variegated flowers: 1) blue, with greenish-blue veins on the standard; 2) very dark blue, almost black; 3) yellow, very rare.

The resistance of this type of *Medicago* to cold is apparently due to a selective acclimatization and not to direct inheritance from *M. falcata*. The crossing probably resulted in disturbance of the equilibrium of the characters, allowing of a gradual selection of types suited to special localities.

In the part of the United States above the 42nd parallel and east of the Rocky Mountains, the climate has so far prevented the introduction of lucerne. There are cases on record where "Grimm" Alfalfa has withstood temperatures as low as —38° F. (—29° C.) (1); so it is to be hoped that it may be successfully introduced into this region.

The great resistance of this variety has been established by numerous experiments, made by the Bureau of Plant Industry and by many farmers in Minnesota, South Dakota and Montana.

Consequently the growing of large areas for seed is to be strongly recommended; as also the fixation of the character of resistance to cold, and its adaptation to the special conditions of climate of the north and north-west of the United-States (2).

J. WENTWORTH-SYKES. **Teff Grass of Abyssinia (*Eragrostis Abyssinica*).** — *Agricultural Journal of the Union of South Africa*, Vol. 1, No. 3, pp. 443-445. Pretoria, April, 1911. **2107**

Teff is much cultivated in the hill parts of Abyssinia. Although there are several varieties, the most popular are white teff, grown in the dry season, and red teff, grown in the wet season. This valuable grass was introduced in 1903 into South Africa by Mr. Burtt-Davy, who had previously introduced it into California. **Abyssinia. South Africa**

(1) This occurred at Fargo, N. Dakota; minimum temperatures of —33° F., —26° F., and —25° F. (—36°, —32.2°, and —31.7° C.) were successfully resisted at Minneapolis, Minn. in different winters. (*Ed.*).

(2) See *Bulletin*, Nov. 1910, p. 60. (*Ed.*).

Red teff is now largely grown in South Africa, as shown by the hundreds of tons of hay sold last year on the Johannesburg and Pretoria markets, which is but a tithe of that sold privately or fed locally.

Its feeding properties cannot be gainsaid, as shown by the following analysis :

Water	15.2 %
Albuminoids	8.2 »
Carbo-hydrates	68.1 »
Fats	2.8 »
Cellulose	2.8 »
Ash	2.9 »
	100.0 %

Cattle, horses, sheep and pigs devour it eagerly. Several breeders of thorough-bred horses have found it excellent for young stock.

The short growing season required by teff (7 to 8 weeks from sowing to harvest) makes it an invaluable hay-crop for regions where the rainy season is short and the total rainfall light.

Instructions are given for its cultivation.

2108 J. J. THORNBER. **Improving and Fencing the Grazing Ranges of Arizona. Formation of Grazing Districts.** — *University of Arizona Agricultural Experiment Station*, Bull. No. 65, pp. 360 + fgs. 6 + pl. XII. Tucson, Arizona, 1910.

The grazing areas in Arizona cover more than 45 000 000 acres in extent, and are extremely diversified as to the season of their forage production and their forage content.

United States: Arizona

Free grazing, with its numerous attendant evils, chief of which are overgrazing and overstocking, has been responsible for the general deterioration and breakdown of the southwestern ranges.

The uncertainty of the rainy seasons, and the severity and length of droughty periods in the southwest, make it imperative for stockmen to provide reserve feed for their herds by fencing and otherwise improving ranges, developing convenient water supplies, so that stock will not be compelled to travel further than three miles for water. They must conserve the ranges during periods of seed maturation and seed germination, eradicate such obnoxious plants as the rayless goldenrod (*Bigelowia Hartwegi* A. Gray, *B. Wrightii* A. G.), grow forage on occasional cultivated areas wherever possible; and by other means the stockmen must build up the range. With partial or complete pro-

tection from stock for periods of four to six years. Small areas ranging from 150 acres (65 ha.) to several thousand acres in extent, of the better class of the ranges, have shown most remarkable and gratifying improvement from year to year, in the way of increased yield. As an instance of this improvement, 15 acres (6 ha.) of land are allowed for each head of stock; whereas on the adjoining open range 25 to 30 acres (10 to 12 ha.) are necessary.

Leasing and fencing of the ranges is no longer in the experimental stage. After nearly 30 years' operation in Texas, and considerably longer than this in Australia, this plan of administering the grazing range has bettered the condition of stockmen everywhere, increased the grazing capacity of the land, and placed the stock growing industry on a reasonably secure basis. Similar results have also been obtained in Wyoming, where many small scattered range areas under diverse management have been fenced.

The control of the public grazing lands by the Government, under reasonable regulations, is the most desirable and efficient means known. This is favoured by a large majority of American stockmen at the present time; who, having experienced all the evils of free grazing, are ready to try any reasonable means that promises to better their conditions.

The plan of administering the grazing ranges as provided for in the bill endorsed by the American Live Stock Association at its regular meeting in Denver, Colorado, January 1908, and introduced in the House of Representatives, March 7, 1910, under No. H. R. 22 462, has many obvious advantages over similar bills heretofore introduced in Congress. This bill provides for the establishment of grazing districts by the Secretary of Agriculture; and the appointment of an officer by the Government to form with a local committee, composed of four representative stockmen, an executive board for administering the grazing district.

Among other things the Executive Board is vested with the power:

1. to determine whether permits shall be issued on an acreage or per capita basis;

2. to determine the number of animals to be grazed in each grazing district, when permits are issued on the per capita basis;

3. to make proper division of the range between different classes of grazing animals;

4. to determine whether the division of the range between different classes of grazing animals shall be by individual or community allotments;

5. to determine preference in allotment of grazing privileges to settlers;

6. to determine value of the improvements and of the use of the same when necessary ;

7. to prescribe rules governing the movement of live-stock across public lands for the welfare of all concerned ;

8. to decide upon the adoption of any special rules to meet local conditions.

The following are the most important of the remaining provisions :

1. Issuing of grazing permits for periods not to exceed ten years, with right to fence, preference being given to homesteaders and present range occupants who own improved ranches, or who have provided water for live stock on the grazed lands.

2. Charging a maximum grazing fee of 4 cents. per acre and a minimum one of one-half cent.

3. Permitting the entry of public land for agricultural purposes at the end of any grazing season, except where land has improvements thereon exceeding $ 100 (500 fcs.) in value, when it shall not be disturbed during the period of its permit, without the consent of the owner of the improvements. Where improvements are worth less than $ 100, satisfactory settlement must be made for them by the settler, before land can be located.

4. Guaranteeing to bona fide settlers and residents the right to graze their animals for domestic purposes on the adjacent public land.

5. Making it a misdemeanor to graze animals without a permit in grazing districts set apart by the Secretary of Agriculture, when a reasonable time has elapsed after the establishment of such grazing districts.

2109 E. RUATA. **The Composition of Alpine Hay in Piedmont.** (Sui fieni alpini delle valli di Lanzo). — *Annali della R. Accademia d'Agricoltura di Torino*, V. LIII, pp. 445-493. Torino, 1911.

These analyses and observations were made on 20 samples of hay from the valleys of Lanzo in the Province of Turin.

Italy: Piedmont

Of the numerous data and observations obtained some may be of interest to other mountainous districts.

1. The hay most deficient in mineral matter is that grown on mountain slopes where the soil is carried away and thinned off by rain-action.

2. On the other hand, on plains, or on valley tablelands, where the layer of soil brought by the torrents is more minutely subdivided

and consequently more fertile, the hay is generally rich in ash and nutritive constituents.

3. The writer records differences of 2 % net in the ash (from 5 to 7 %), due to the different geological formation of the underlying rock.

4. The percentage of pentosans, which is already high in Alpine hay, goes on increasing in hay grown at high altitudes; whilst the proportions of starch and sugar content decrease to an appreciable extent.

5. The writer advises not only the usual manures, but especially lime and wood-ash, to supplement possible deficiencies in lime and potash.

Cotton in Afghanistan. (Die Baumwollkultur in Zentralasien). — *Das Handelsmuseum*, B. 26, N°. 28, pp. 442-443. Wien, 13 Juli 1911 **2110**

The present Emir takes a great interest in the agricultural and economic status of Afghanistan, and does all he can to develop the cultivation of cotton, in which a flourishing industry already exists at Kandahar. Afghan cotton is constantly gaining ground on the Indian market. **Afghanistan**

At Chanam, the frontier market between Afghanistan and Beluchistan, Indian cotton cannot compete with Afghan cotton (1).

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(1) Two crops per year are raised almost all over Afghanistan. The first, which is harvested in summer, is sown towards the end of autumn. This crop includes wheat, barley, lentils, chick-peas, and beans. The second, harvested in the autumn, is sown towards the end of spring, and comprises rice, millet, panic (*Panicum italicum*), maize, etc. Castor-oil, madder-root, and asafoetida, thrive in this country.

Fruits such as the apple, pear, almond, peach, quince, apricot, plum, cherry, pomegranate, grape, fig, and mulberry, are widespread, and form the staple diet of a large section of the population all the year round, both fresh and preserved; in which latter form they are exported in large quantities.

The chief industries are the manufacture of silk, felt, carpets, camels-hair and goats-hair goods, and chaplets.

The chief exports from India to Afghanistan are cotton-goods, indigo and other dyes, sugar and tea, (chiefly Chinese leaf). India imports from Afghanistan horses, fruits, vegetables, wheat, *ghi* (butter), wool, silk, cattle, hides and tobacco.

One of the most important industries of Kabul is the preparation of " postin " sheep-skins.

The Statesman's Year-Book for 1911, p. 571. (*Ed.*).

2111 P. VENKAYYA. **Cambodia Cotton in India. Experimental Cotton Farm at Munagala, Madras.** — *The Agricultural Journal of India*, Vol. VI, Part 2, pp. 160-169. Pusa, April, 1911.

ritish India

The reason why the Indian mill-owners have to restrict themselves to the production of coarser sorts of cloth is the quality of cotton grown in the country at present. It is to solve this problem of finding out a long-stapled cotton, which may be grown in place of the inferior varieties of short-stapled cottons now raised all over the country, that an experimental cotton farm was started by the zemindar of Munagala in the Kistna District (Madras). This Cotton Experimental Farm has been working for the last two years.

About eleven varieties of cottons have been tried, six of them being among the most important cottonso f the world. These are: the famous « Sea-Island » cotton of the United States, which stands to-day unequalled on the cotton market; the Egyptian cotton, which is supposed to have been originally the same as the « Sea-Island », but altered by cultivation and climatic conditions in Egypt; the « Caravonica » cotton of Queensland, in Australia; which was produced by crossing the Sea-Island and Pernambuco cottons; the « Spence tree cotton »; the « Kidney cotton »; and the « Cambodia » cotton, a native of the Indo-Chinese Peninsula. This Cambodia variety is a hardy and long-stapled annual, yielding lint of a superior white colour.

Of these, the Sea-Island and Caravonica cottons, being plants which require the influence of the sea, did not give any satisfactory results. The Egyptian cotton, which requires a very high standard of cultivation and copious irrigation, both of which are a little above the means of the ordinary Madras cultivator, did not succeed very well.

The « Kidney cotton » became very herbaceous and yielded little in the first year, whereas the Cambodia cotton gave very excellent results. Reports of the Bombay Chamber of Commerce on Cambodia cotton suggest that this hardy long-stapled cotton may possibly ultimately revolutionise the cotton cultivation of India.

The great advantage and importance of Cambodia cotton is that it is practically a hardy annual, but not a perennial (for perennials are always subject to insect pests) that it is sown exactly at the same time when all the country cottons are sown, and also ripens just at the same period as the rest of the Indian cottons. It needs moreover no irrigation, and the treatment it requires is also just the same as that given to any other cotton at present cultivated in India. Cambodia cotton will also grow and flourish practically in any soil in India, on which the ordinary country cottons

grow and flourish; and it fetches a higher price than any other country cotton.

At the same time Cambodia cotton also solves the problem of long-stapled cotton for the manufacturer. A brief account of this cotton and the method of its cultivation is given, with some special remarks on the importance of seed selection.

Fox (Commercial Attaché). **Cotton Cultivation in China.** — *The Board of Trade Journal*, No. 761, pp. 674-675. London, June 2, 1911. 2112

The trade returns of the Imperial Maritime Customs for the yea 1910 show an export of raw cotton from China to foreign countries of 1 247 304 piculs (about 750 000 quintals). This is an increase of nearly 100 per cent. over the previous year's export. China

The all-round increase in production, more especially in North-China, is undoubtedly in great measure due to the substitution or cotton for the opium poppy, as a result of the measures taken by thef Chinese Government to prohibit the cultivation of opium.

Official encouragement has been given to the formation of societies for the study of cotton cultivation. In several provinces the Government have made free distributions of seed, and have appointed agents to instruct the people in improved methods of cultivation. The experiments which have been carried on during the past year in the province of Chihli appear to have been particularly successful.

Cotton Seed for Eastern Ecuador. — *The Pan-American Union*, p. 1075, Washington, June, 1911. 2113

The Government of Ecuador has instructed its consul at Paita, Peru, to secure cotton seed of the best class of cotton raised in that locality for distribution to plantation owners and farmers in Ecuador. Ecuador

Ecuador. A large area in eastern Ecuador is said to be particularly adapted to cotton cultivation; and much interest is now being shown in the introduction of this useful fibre plant in that part of the country.

Cotton in Brazil. (O Algodâo no Brasil). — *A Evoluçao agricola*, Anno II, No. 23, pp. 19-20. Sâo Paulo, Maio, 1911. 2114

Cotton is grown more especially in the nine States of North Brazil: Bahia, Sergipe (1), Algoas, Pernambuco, Parahyba, Rio Grande do Brazil

(1) See Abstract 1740, *Bulletin*, June, 1911.

Norte, Ceara, Pianhy and Maranhàs. The annual crop may be valued on an average at 71 000 000 kg. (68 160 English tons) of which 40 000 000 (39 200 English tons) are used by the local mills.

The Pernambuco district supplies 65 % of the total crop and of the best quality. The cotton grown in the State of Sâo Paulo is the *Gossypium herbaceum* originating from North America. The average length of the fibre is 33 mm. (1.287 inches) and its resistance from 6 to 9 grams (92 to 138 grains). An *alqueire* (24 200 sq. metres = 5.97 acres) produces on an average 3 750 kgs. (71.25 cwt.) of raw cotton, yielding 1125 kgs. (22.37 cwt.) of cotton ready for the mill.

The cost of production may be estimated at 480 milreis (£54) per *alqueire*, and the profit at 645 milreis (£70 5*s*), estimating on the basis of the sale price of raw cotton, which is 4 ½ milreis for 15kgs. (about 4*d* a lb.).

The following table shows the present status of the textile industry in South America (1).

Number of Factories		Hand-looms (teares)	Other looms (Metrers)
Brazil	137	1 000 000	35 000
Mexico	139	726 200	25 300
Peru	7	52 700	1 750
Colombia	5	20 000	300
Venezuela . . .	2	11 000	250
Argentina . . .	6	9 000	1 200
Guatemala . . .	1	6 000	150
Chile	3	5 000	400
Ecuador	4	5 000	200
Uruguay	3	5 000	300
Total . . .	307	1 839 400	64 850

2115 J. S. ATTWELL. **Cotton in the Chaco Territory, Argentina.** (Cultivo del Algodón en el territorio del Chaco). *Bolletin del Ministerio de Agricultura*, T. XIII, No. 6, pp. 289-296. Buenos-Aires, Junio de 1911.

The cotton of the high-lying pampas of Paranà and Paraguay rivals in quality that of North America.

Argentina: Chaco

The Argentine Republic could grow cotton in the north on an area of about 12 000 000 hectares (29 100 000 acres); *i. e.*, an area corresponding to that under cotton in the United States, by utilising the excellent labour supplied by the Italian immigrants.

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(1) See Abstract 1738 and 1739 *Bulletin*, June 1911.

But if the Chaco territory is to become a great cotton growing country, railways must be developed. The large profits secured have led to 2 000 hectares (4 940 acres) more being planted to cotton this year. Last year from 2 to 3 tons was obtained per hectare (1 800 lb. to 2 700 lb. per acre). When the whole of the territory of Chaco is under cotton, the agricultural wealth of Argentina will be doubled.

Cotton in Tunis. (Le coton en Tunisie). — *Bulletin Agricole de l'Algérie et de la Tunisie*, 7e année, No. 9, pp. 236-239. Alger-Mustapha, 1er Mai, 1911. 2116

Damp is injurious to cotton seed, which should only be sown in Tunis in dry and warm soil ; the minimum warmth of the soil should be 10° C. Manuring is essential. Cotton can be followed in Tunis by crops of chick-peas, green- peas, haricot beans, maize, sorghum, etc. to avoid the loss of a year. Tunis

Experiments made in 1910 with seed of the " Mitafifi " and « Yanovitch » varieties, received direct from Egypt, gave the following results.

Area planted	1 hectare (2.47 acres).
Yield of raw cotton	1400 kgs. (3 085 lb).
Period of picking	From Oct. 15 to Jan. 8
Irrigations	Every 15 to 20 days from June 1, to end of September.
Cost of picking by Arab women	from 9 to 10 fr. per 100 kg. (3*s* 4*d* to 3*s* 9*d* per 100 lb.), or 130 to 140 frs. per hectare (£2 . 2*s* 8*d* to £2 . 5*s* . 11*d* per acre.)

These experiments will be continued and extended. Cotton will be planted this year in the region of Souk-el-Khemis on 20 hectares (about 50 acres) divided among 5 farmers.

The « Mitafifi », « Biancavilla » and « Mississipi » varieties will be raised on irrigated lands.

Cotton in the Transvaal. (Baumwollkultur im Transvaal). (U. S. Consular Report) — *Das Handelsmuseum*, B. 26, Nr. 24, p. 378. Wien, 15. Juni 1911. 2117

The « Witwatersrand Agricultural Society » decided, in 1910, to award prizes for cotton grown in the Transvaal. Samples were sent to England to the « Cotton Growing Association », which judged the Transvaal

best products. The quality of the crop obtained with the « Bancroft » variety is the best for commercial and manufacturing purposes. The results of the experiments made at the Barberton Station were also satisfactory. This points to the conclusion that the cotton-belt in the Transvaal extends far beyond the plains which have hitherto been considered as alone likely to prove suited to cotton. However the yield per acre is less than that obtained in the United States.

The South African Government is now building a railway, specially intended to open up the cotton districts of Zoutpansberg.

2118 **Flax in Russia** (Russie, la culture et l'industrie linière). — *Bull. Mens. de l'Office de Renseign. Agricoles*, X Année, N°. 6, pp. 736-744. Paris, Juin, 1911.

Flax is raised in almost all the provinces of the Russian Empire. In the flax-growing provinces of the North and North-West it is the chief, and sometimes the only, financial resource of the peasantry. Over 1 million dessiatines (2 700 000 acres) are under flax grown for its fibre, and the annual average yield for the period 1902-1906 was 22.5 million pouds (362 722 tons) of fibre.

Russia

Flax-fibre is an important export, coming next to cereals ; the average exports for the period above mentioned amounting to 13.5 million pouds (4 347 000 cwt.) valued at 60 million roubles (£6 250 000). Russia also exports a large quantity of linseed: 5 225 000 puds (1 682 450 cwt.) valued at 7 739 000 roubles (£806 250) in 1907. The latest statistics show that the receipts obtained from the flax industry amount to 162 200 000 roubles (£16 859 000). 70 000 workmen are engaged in Russia in manipulating flax by machinery, and hundreds of thousands of workers are employed as artisan-weavers, net-makers, lace-makers, etc. The yield per dessiatine (2.7 acres) is estimated from 17 to 20 pouds (612 to 720 lbs.) whereas, some time back, the amount was 22.5 to 25 pouds (810 to 900 lb.). The yield in Prussia is 36 pouds (1296lbs.); in Ireland from 33 to 37 pouds (1188 to 1332 lbs.); in Belgium from 33 to 40 pouds (1188 to 1440 lbs.) in Bohemia 40 puds (1440 lbs.); and in France from 55 to 58 pouds (1980 to 2088 lbs.).

The constant decline in the yield has been accompanied by a like decline in the quality of the fibre. The unfavourable conditions under which flax is raised and sold are exercising a disastrous influence on the flax-industry in Russia. Other conditions, such as the high railway rates for the carriage of flax products, the ever-growing importation of jute, 1884 000 pouds (606 648 cwt.) worth 6 581 000

roubles (£685 500) in 1907, and the importation of nets, prevent the more active development of the flax industry.

This report (which was communicated to the French Consulate at Moscow by the Society of Russian Merchants and Manufacturers of Flax) proposes measures for the improvement of the cultivation and trade in flax. These measures are the spread of technical knowledge amongst the peasantry; providing stocks of high quality seed; severer inspection to detect adulteration in flax; the organization of exhibitions, of local flax exchanges, of credit, of co-operative associations; a rise in the import duty on jute, nets, etc.; special export tariffs, etc.

F. M. Coventry. **Agave: a New Industry for Behar, India.** — *Dep. of Agr. of Bengal: Quarterly Journal,* Vol. IV, No. 3. Calcutta, January 1911. **2119**

As a result of extensive experiments in the cultivation and manufacture of agave for the past ten years, the writer now states that the suitability of the Behar soil and climate to the cultivation of agave is quite satisfactory. There are several lands that at present are giving a very poor return from either indigo or country crops; and yet many of these are most suitable for agave, and will give a better return than what is now being obtained from even the better class of lands. Agave plants pole, in good soils, after the sixth or seventh year; but this need not be necessarily the end of the cultivation, as the plants throw out suckers. All these except one to each plant should be cut away. **British India: Behar**

This one, by the time the parent plant poles and dies, will be in full growth and will carry on the production. The best varieties to plant are *Agave rigida*, *A. sisalana*, both the thornless and thorny varieties; these give from 3 ½ to 4 ¼ per cent of dry fibre. There is a prevailing idea that the thornless variety is superior to the thorny, and that the fibre is stronger. This is so, if one strand of fibre of each variety be tested, the thornless variety being coarser; but weight for weight, and when spun, the thorny variety is quite as strong.

It is also more glossy and pliable, and in the market realises an equal if not better price. Cutting and manufacture can be commenced the second year after planting. The leaves will then be small and give a poor out-turn. From the third or fourth year the leaves should be full size, averaging one pound each. Every plant will give from 15 to 20 leaves a year; allowing 1 600 plants to the acre, and reckoning at only 3 ½ per cent of fibre, this would give 1 120 lbs. of fibre per acre, or 2 acres to a ton.

The manufacturing cost, including cutting, earthing, baling, freight to Europe, insurance etc. comes to £12 a ton. To this have to be added the expenses of cultivation, rent, supervision etc. which amount to about £3 on two acres. The total cost of the fibre landed in Europe averages therefore £15 a ton. A few years ago agave fibre was selling at from £30 to £40 a ton. The present price is about £23 leaving a profit of £4 an acre.

The writer states that these figures are not at all over estimated.

2120 C. H. KNOWLES. **Sisal Hemp in Fiji.** *Department of Agriculture, Fiji, Bulletin* N°. 1, pp. 1-16. Suva, 1911.

The cultivation of sisal hemp is now being taken up in the Fiji Islands. There is much land in the group which from its hilly nature and the poorness of the soil is quite unfitted for one of the three **Fiji Is.** chief industries: sugar, copra, or bananas. It is upon these lands that sisal hemp is likely to prove most satisfactory.

Dryness of the soil is a very important point in sisal-hemp growing. It is *Agave rigida sisalana* which is recommended for use in Fiji. Plants have been obtained from Hawaii and Queensland.

The sisal-hemp plant requires little attention when it has been planted out; and the cultivation is confined to preventing weeds from shading the plants and removing suckers. Each hectare may contain about 1200 plants. Leaves are mature when they have reached an angle of 45° to the vertical.

2121 F. MAIN. **"Akond" or "Fafton": Fibre of *Calotropis*** (1) (« Akund » ou « Fafton », fibre du *Calotropis*). — *Journal d'Agric. Tropicale*, IIe année, No. 120, pp. 190-191. Paris, Juin 1911.

India. Africa Much has been heard of late of a fibre improperly called « Akund cotton ». It is not the cotton of a malvaceous plant, but of an ascle-

(1) *Caloiropis gigantea* R. Br., an evergreen bush which grows wild on dry lands, is widespread throughout India, China, and the Straits Settlements. It yields guttapercha, manna, a dye, and tannin. A fermented liquor is prepared from the sap. The bark contains a fibre which can be used by paper mills. The seeds are furnished with silky tufts of filaments. This plant would be of value for growing on dry lands. One acre of land planted with Akund at a distance of 4 feet apart, would supply 10 tons of green stems, or 582 lbs. of fibre. The cost of a plantation would amount to £2 9*s.* 8*d.*, but the cost of up-keep would be nil. Cf. WATT, *Dictionary of the Economic Products of India*, Vol. II, pp. 34-48. (*Ed.*).

piad. Now it is well known that the fibre of asclepiads either cannot be spun, or spins very badly. It is said to be imported into Europe along with kapok to use as a mixture in weaving, and Huppeld says (*Tropenpflanzer*, Nov. 21, 1910) that over 8 000 bales of this fibre are imported annually into Europe. Died and mixed with cotton it can be spun as fine as No. 30 cotton.

Confusion has always been made in the names, and this fibre, which in India is known by the name of Akond, is often described as kapok or Mudar. *Calotropis* grows wild in many arid regions ; the coasts of North Africa are overgrown with it, and its fibre goes by the name of « Fafton ».

The writer believes that *Calotropis* will continue for a long time to be a product which will only be gathered from the wild plants and not cultivated. The fibre content of the stalks, which is only 1 ½ %, ensures a very small yield per hectare.

Spinning « Kapok » and « Akond » in Germany (Kapok und Akon). 2122
Deutsche Kolonial-Zeitung, 28. J., Nr. 29, p. 491. Berlin, 22. Juli 1911.

Hitherto it has been impossible to spin the fibre of Kapok and Akond seed, two bushes which grow plentifully in the German colonies, it being too short. After 20 years of effort, Mr. Stark, manager of a spinning-mill at Chemnitz, has succeeded in so doing. This discovery is of great importance, as these plants, which belong to the families of the *Asclepiadiaceae* and *Apocynaceae*, require little cultivation. **Germany**

Stuffs woven from Kapok and Akond can be used for undercloth-ing, and especially for making life belts, as the high percentage of vege-table wax they contain makes them float easily.

. Gyarfas. **Sugar Beets: Experiments with Husked Seed.** (Versuche mit geschältem Rubensamen). — *Ungarische Zeitschrift für Zuckerindustrie und Landwirtschaft*, XL. J., 3. H., pp. 398-413. Wien, 1911. 2123

These preliminary experiments were made at the Royal Hungarian Agricultural Experiment Station at Magyaróvàr (*K. ung. Landesversuchsstation für Pflanzenbau*). **Hungary**

They led the writer to the conclusion that the advantages attributed to husking the seed: *i. e.* an earlier crop, increased yield in roots and sugar, etc., are often, but not always, realised, and would seem to depend on many causes. The writer did not observe that such

husking protects the plant against the disease known in German as « *Wurzelbrand* » and other similar diseases (1).

Results obtained when crops are raised on a large scale are often quite different from those in the experiment station ; and are even sometimes diametrically opposed.

2124 **Sugar Beets in Mexico.** (Remolacha de Azucar Mexico). — *El Hacendado Mexicano*, Vol. 9, CC. p. 258. Mexico, Julio 1º de 1911.

The Mexican Government has granted a concession to a Company for the establishment of a beet-sugar factory at Tampico.

This will be the first factory of the kind erected in Mexico ; it is
Mexico the first step taken towards the introduction of a new industry which will be very profitable, as the region of Tampico is admirably suited to raising sugar-beets, the yield of which is much higher than that in the United States.

2125 **The Production of Sugar in Porto-Rico.** Report of the German Consul at San Juan. (Die Zuckerproduktion Portoricos). — *Das Handelsmuseum*, Nr. 26, S. 409. Wien, 29. Juni 1911.

In 1910, the amount of sugar exported from Porto-Rico rose to 284 522 tons as against 68 909 tons in 1901. This increase is due less to the increased area under sugar canes than to the perfected methods of cultivation and to the first class industrial plant employed.

An experiment station has been opened at San Juan, and in some districts cultivation by irrigation has been introduced. One refinery in the South produced 48 000 tons of sugar. Molasses are also exported in ships fitted with tanks. In 1910, 10 000 000 gallons were exported (2).

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(1) According to SORAUER (*Handbuch der Pflanzenkrankheiten*, 11 Bd. Lief. 3, p. 129, Berlin, Paul Parey), the stalk disease of beets known as " Wurzelbrand ", or " Schwarz Bein " (black stalk), may be produced, amongst other causes, by Oomycetes of the genus *Pythium*. (*Ed.*).

(2) The area under cultivation in Porto-Rico, in 1899, was divided into 39 021 holdings. The chief products of the island are sugar, tobacco, coffee, pineapples, grape fruit (*Citrus Decumana*), oranges, and other tropical fruits, Sea-Island cotton, textile fibres, bat-guano, phosphates and vegetables. 68 909 tons of sugar were exported in 1901, valued at 4 715 611 dollars, and 284 522 tons in 1910, valued at 23 545 922 dollars. Sugar represents 60 % of the total exports.

When the irrigation works are completed in the south of the island, on which the Government is spending 3 000 000 dollars, the production of Porto-Rico will be considerably increased.

The Statesman's Year-Book 1911, p. 554. (*Ed.*).

Sugar Cane Plantations and the Sugar Industry in Mauritius. (La culture de la Canne et l'industrie sucrière à l'Ile Maurice). — *L'Agriculture pratique des Pays chauds*, No. 99, p. 517. Paris, Juin 1911. 2126

Mauritius is essentially a sugar colony. During the first 15 years of British rule, the sugar exported was inconsiderable ; but in 1825 this industry was stimulated by the introduction of Mauritius sugar on the British market, on the same conditions as that coming from the West Indies. Moreover, the recruiting of coolies in India, to replace the slaves on the plantations, brought about a considerable increase in the production of sugar; of which over 120 000 tons were exported in 1855. Mauritius

Since then, production has fluctuated considerably from year to year, but the average has been fairly stationary. Since 1895, though subject to considerable variations, according to the crops, the average output of sugar has greatly increased: partly owing to improved methods of cultivation and extraction, and partly to the larger area now under sugar. The average annual production now amounts to 200 000 tons of sugar, obtained from about 53 922 hectares of land (133 187 acres) (1).

Maize as a Sugar Crop. (Le Maïs, culture sucrière). — *Bulletin agricole de l'Algérie et de la Tunisie*, 17e. An., No. 11, pp. 303-304. Alger, 1er Juin, 1911. 2127

So far sugar manufacturers have never thought of utilising the proportion of sugar which maize, like sorghum and sugar-cane, contains in its stalk. (2) Algeria. United States

If the ear is detached from the stalk when still milky, a gradual but constant accumulation of sugar takes place in the stalk, equal to the average sugar content of the best sugar-cane (17 %).

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(1) The chief exports from Mauritius in 1901 were: sugar £2 031 497, rum, £2 346, treacle, £32 333, aloe-fibre, £33 896, cocoanut-oil, £8 087, vanilla, £3,822. *The Statesman's Year-Book 1911*, p. 183. (*Ed.*).

(2) « Cortez informed Charles V that bees' honey, wax, and maize-stalk honey was sold on the market at Tlatloc. Marabelli was the first European to obtain a syrup, similar to honey, from maize stalks; this syrup he afterwards converted into solid sugar, similar to cane sugar. Messrs. Burger, Parmentier, Deyeux, Pictet, and many other chemists have since obtained sugar from maize stalks, either green or dried.» CARLO BERTI-PICHAT, *Istituzioni di Agricoltura*, Torino, 1863, Vol. IV, p. 1121. (*Ed.*).

Moreover, maize from which the ear has been removed no longer assimilates the silica which encrusts the peripheric fibres of the stalk, thus making it impossible to utilise the pulp. When the sugar has been drawn off, the whole substance of the stalk could be reduced to pulp and cellulose for paper-mills, or could be made into denatured alcohol, or pressed to form a cattle-feed.

According to Prof. Stewart, maize contains 88 % of sap with 13 % of sugar, which means a yield of from 81 to 91 kgs. of sugar and 90 kgs. of pulp per tonne (1). The green ears would yield 10 % of their weight in alcohol at 95°, and a residuum of 5 % in pulp and oil-cake, rich in albuminous matter.

A company with a capital of 10 million dollars has set up a factory at Murrysville, Westmoreland C°, Pa., which is now at work drawing off the sugar from maize and using its other industrial bye-products.

2128 A. Mc Kerral. **The Bambarra Groundnut.** *The Agricultural Journal of India*, Vol. VI, Part II, pp. 172-174. Pusa, April, 1911.

Tropical Africa. Mauritius

The Bambarra groundnut (*Voandzeia subterranea*) is cultivated throughout tropical Africa, from the Sahara to Natal. It is a leguminous plant, in habit somewhat similar to the ordinary groundnut (*Arachis hypogoea*), but differing from it in that is has less development of leaf system, and in that it forms its fruits around the principal stem and at a very small depth in the soil. This last characteristic of the Bambarra nut gives it a superiority over ordinary groundnut, in so far as the harvesting of the former is much more easily done than that of the latter. To harvest the crops, the stems are pulled up and nearly all the nuts adhere to them. The pod is very like that of the ordinary groundnut, but is shorter, contains only one seed at maturity, and possesses a prominent ridge, which is absent in the pod of *Arachis hypogoea*. In Mauritius, the Bambarra groundnut is found to be a useful crop for cultivation between the rows of sugar cane. The yield is said to be at least equal to and generally greater than that of ordinary groundnut. The composition of the dried nuts, as determined at the Agricultural Station, Mauritius, is shown in the following table:

	Green			Ripe		
	Nuts	Shells	Entire Fruits	Nuts	Shells	Entire Fruits
Water	45.40	17.96	63.36	10.27	2.00	12.27
Ash	1.28	0.18	1.46	3.23	0.71	3.94
Cellulose	2.35	1.23	3.58	4.63	5.23	9.86
Fats	2.41	0.02	2.43	5.03	0.14	5.17
Sugar & Starch .	20.49	2.66	23.15	46.80	8.60	55.40
Albuminoids . . .	5.67	0.35	6.02	12.04	1.32	13.36

(1) 1 tonne = 1000 kgs. = 0.984 ton (English). (*Ed.*).

With respect to the relative demands on the plant food of the soil, it has been ascertained that the Bambarra nut requires a little less phosphoric acid but much more potash than ordinary groundnut. Its nitrogen content however, is always less.

C. Touchais. **Note on Shade-Trees in the Coffee-Plantations of the Agricultural Society of Yen-Lay, Tonking.** (Note sur les Arbres d'Ombrage dans les plantantions de Caféiers de la Société agricole de Yen-Lay (Tonkin). — *Journal d'agriculture tropicale*, IIe. An., No. 120, pp. 166-169. Paris, Juin 1911. 2129

For the past ten years some two hundred thousand coffee-trees have been planted at Yen-Lay, all sheltered by Chinese Wood-oil trees (1), *Albizzia*, *Grevillea*, kopik and Chinese Lilac trees (2). Only one square has been left without shade to act as a control. Tonking

Shade has been found necessary on coffee plantations in Tonking. The trees thus sheltered are finer, and are protected from the wind which is always injurious to coffee-trees ; they also seem to be protected somewhat against the attacks of the « borer ».

A study of the advantages and drawbacks of each kind of shade tree used, shows that Chinese Wood-oil trees should be planted if an under-crop is desired, and if leguminous plants which grow well are not available.

Albizzia, even without a bye-product, will always ensure better and more regular crops, even if the value of the Chinese Wood-oil nuts is taken into account.

(1) *Aleurites cordata* Steudel, of the family of the Euphorbiaceae, from the seed of which a drying oil known as Chinese-wood-oil, or Ning-po varnish is obtained. This Chinese and Japanese tree is cultivated in North West India. See: Sir Dietrich Brandis *Indian Trees*, p. 576, London, 1907. (*Ed.*).

(2) Chinese Lilac or Xoan is, according to the *J. A. T.*, *Melia Azedarach*, which Brandis in *Indian Trees* calls also Persian Lilac, and which Countess San Giorgio in her " *Catalogo poliglotto delle piante* " calls Indian Lilac. But neither in Watt nor elsewhere have we found « Xoan » amongst the list of vernacular names; on the other hand, the *Dictionary of Plant Names* of Gerth Van Wigk (Haarlem, 1911) gives the French name *Lilas de Chine* for *Melia Azedarach*. (*Ed.*).

2130 **Coffee Varieties and Manuring.** — *Tropical Life*, No. 5, p. 87, London, May, 1911.

Tropical Countries

Coffea canephora, of which *Coffea robusta* and *Coffea laurentii* appear to be varieties, has a special value to planters, since, without being absolutely immune to *Hemileia vastatrix*, this species and its subvarieties offer great resistance to the disease, besides giving heavy yields at an early age. It is on this account that the Dutch are so strongly advocating the planting of these coffees in preference to *Coffea arabica* and even the more vigorous *Coffea liberica*, both of which have proved unable to resist the *Hemileia* in Java. When planting these coffees the plants should be liberally manured, in order to have an ample supply of plant food and nourishment to draw on when building up their wood and leaves; otherwise exhaustion sets in and the trees are extremely susceptible to disease. Exhaustive experiments in Brazil, Madagascar, Indo-China, and especially in Java, suggest the following quantities per tree, according to age.

	Phos. Acid. grams	Potash grams	Nitrogen grams
Up to 4 years	1.13	10.72	4.48
4-8	8.88	24.90	16.20
9-20	7.15	20.81	13.20
20 and over	4.30	13.85	2.31

Compared with the above supplies proposed to be returned to coffee soils, the following is supposed to be abstracted by every 1000 kgs. of coffee removed from the trees at Deli (Sumatra), the ages of which are, however, not mentioned :

	1000 kgs. coffee as exported	3800 kgs. as picked to make 1000 kgs. as exported
Phosphoric acid . . .	2.897 kg.	3.974 kg.
Sulphuric acid	0.490 »	1.652 »
Lime	1.486 »	4.846 »
Potash.	14.441 »	28.720 »
Nitrogen.	16.800 »	23.856 »
Magnesia.	2.299 »	3.492 »

2131 **The Cultivation of Tea by the Natives of Java.** (La culture du Théier par les indigènes à Java). — *La Quinzaine Coloniale*, 15e année, N. 10, p. 344-345. Paris, 25 mai 1911.

Java

In Java, the cultivation of the tea-plant is a source of profit to the natives and advantageous to the economic condition of the country.

But whilst it is desirable that such plantations be extended, the native should be taught to cultivate them scientifically, and should therefore receive the technical training needed to ensure his harvesting a product which can be utilised. The native planters must also associate, and get into close touch with the firms that prepare tea for the market, in order to avoid social crises. Local exhibitions should be organized and prizes awarded to the best exhibits.

The future economic status of tropical colonies depends largely on native agriculture. It would be desirable that all tropical colonies should bear this principle in mind, which has already led to satisfactory results in the Dutch East Indies and which will lead to yet better when the effect of scientific training has had time to make itself felt. (1)

Mixed Plantations of Cacao and Rubber. (Cultivo combinado de cacao y caucho). — *El Hacendado Mexicano*, V. 9º, pp. 214-217. Mexico, Junio 1º de 1911. 2182

Castilloa rubber is admirably adapted to the natural conditions prevailing in the cacao zone, and can be planted along with the cacao-tree as a shade tree, and as a wind break, the disadvantages of a single crop being thus avoided. Mixed plantations should be planted at the same time, and in any case the interval between planting the trees should never exceed one year. *Castilloa* rubber-trees, when 4 or 5 years old, are taller than cacao-trees, which they shade without doing them the slightest injury. Mexico

But these advantages have only been recorded on the mainland. In the West Indian islands it seems better to plant the cacao-tree together with *Hevea brasiliensis*.

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(1) Area in Java and Madura cultivated by the natives, in 1908, 7 786 964 acres. The various cultures were as follows, in 1908: Rice, 5 741 561 acres; Maize, Arachis, Cotton and various plants, 5 580 858 acres; Sugar-cane, 342 895 acres; Indigo 30 395 acres. Total area under crops 12 031 576 acres.

The production of tea, in Java, in kilogrammes, was as follows: 1902, 7 523 422; 1905, 11 228 628; 1906, 11 961 710; 1907, 11 494 665; in 1908, 15 196 894.

Owing to the " Agrarian law " (1870) which has afforded opportunity to private energy for obtaining waste lands on hereditary lease (emphyteusis) for 75 years, private agriculture has greatly increased, both in Java and in the Outposts. In 1908; 1 090 326 acres were ceded in emphyteusis in Java by the Government to 847 Companies and Europeans; to 69 Chinese, 30 968 acres; to 5 natives, 770 acres: a total, ceded in emphyteusis, of 1 122 060 acres. *The Statesman's Year-Book 1911*, p. 1053. (*Ed.*).

2133 **Tobacco Plantation at Deli, Sumatra.** (La culture à Déli, Sumatra). *Le Tabac*, XXXI. An., No. 492, pp. 3-4. Paris, 4 Juin 1911.

The best tobacco-plantations of Sumatra are at Deli, on the east coast of the island.

In preparing the fields for tobacco they are first ploughed by oxen. When the ground is covered with undergrowth, or when virgin forests are cleared for plantation, the trees and bushes are cut down and burnt on the spot and the ground is then ploughed with a steam plough. Young tobacco plants obtained from nurseries are planted out in April. In July they have attained the height of a man, and are ready to be harvested. The leaves are cut from the bottom upwards, according to the degree of ripeness they have attained ; they are bound into sheaves which are placed in outhouses to dry, and from thence sent to great fermenting rooms. For this purpose, they are carefully heaped up on reed mats and covered over with the same. After fermentation, the leaves are sorted and selected for their firmness and colour, and placed in heaps of like quality, which are then removed for packing. They are made into parcels with the help of a press, and then sewn between reed-mats. These parcels are stamped with the factory mark, and with numbers indicating the quality and length of the leaves. (1)

Dutch East Indies: Sumatra

2134 **The Brazilian Tobacco Industry.** *Journal of The Roy. Soc. of Arts*, No. 3061, pp. 880-881. London,, July 21 1911.

At present, tobacco forms the sixth item in importance on the list of Brazilian exports. Of the total exports of tobacco from Brazil, about 95 per cent is shipped from the port of Bahia. Practically all the coast regions of Bahia produce tobacco to a greater or less extent. The area of greatest production is a comparatively small portion of the State of Bahia, centring about the bay and port of that name. Of late years, a somewhat intensified cultivation has been developed in Rio Grande do Sul and in the southern Minas Geraes. The State of Bahia exports to other parts of Brazil an average of

Brazil

(1) The following figures show the tobacco output of Sumatra, during recent years in kilogrammes.

Years	No. of plantations	Output of tobacco
1906	106	21 483 587
1907	108	23 342 066
1908	116	23 341 833

The Statesman's Year-Book 1191, p. 1054. (*Ed.*).

about 3 000 tons of tobacco per annum, in addition to an average of 22 500, or perhaps 25 000 tons sent abroad. The second most important areas producing tobacco are in the State of Minas Geraes. There is also a notable increase in the attention given to the cultivation of tobacco in the State of Santa Catharina. In São Paulo the industry has become decadent with the growth of the coffee industry.

It is estimated that the total production of tobacco in Brazil is about 26 500 tons annually.

Well-fertilised land in the better districts of Bahia will, under existing conditions of culture, produce a maximum of 800 pounds per acre, but the average production is not much above 300 pounds per acre. In many districts from Bahia northward, tobacco is planted in any soil which will not produce sugar-cane or cotton. In the best tobacco-producing areas in the Bahia district the soil is black, heavy, and usually very rich, formed of limestone. It is generally accepted that, with the exception of two or three varieties of island tobacco grown in New Caledonia, practically all known varieties of tobacco are grown in Brazil. Among others, there are a large number of varieties indigenous to the country.

The tobacco produced is used for all purposes, that of Bahia only being suitable for really good cigars. The greater part of the tobacco is strong, though some very good mild tobacco is grown in Bahia and of late in Rio Grande do Sul. There is no doubt that Brazil offers a great opportunity for tobacco production; and when scientific and modern agricultural methods have been more generally adopted, the country will be a much greater factor in the world's tobacco trade than it is at present.

J. Muszynski. **Experiment in Opium Growing in the Botanical Garden of Dorpat, Russia.** (*Pharmatsert Journ.*, 1911, p. 246). — *Journal de Pharmacie et Chimie*, 103e année, 7e série, tome IV, N. 2, pp. 74-75. 16 Juin 1911. **2135**

The writer sowed two beds in the Botanical Garden at Dorpat (Yuriev) with poppy seed. He selected two varieties: *Papaver somniferun* L. var. *glabrum* β, with bluish seeds, a native variety commonly grown in Russia for its seed ; and *Papaverum somniferum* L. *flore pleno*, a garden variety. The blue seeded poppy ripened in very rainy weather, so that it was difficult to gather the opium. The double flowered poppy supplied a double quantity of dry opium. The morphine content of this opium, as determined by Dietrich's method, showed 12.2 % of anhydrous morphine. **Russia: Baltic Provinces**

2136 **The Production and Exportation of Hops in Austria and Germany.** (Hopfenproduktion und Export in Oesterreich und Deutschland). *Das Handelsmuseum*, Bd. 26, No. 27, pp. 420-421. Wien, 6 Juli, 1911.

Of recent years Austria has been constantly extending the area of its hop-gardens, whilst in Germany the area has decreased.

Austria. Germany

The exportation of hops from Austria amounts on an average each year to 37 750 quintals (74 300 cwt.) from 1891 to 1900, increasing considerably from 1901 to 1910, so much so that the average for this period amounted to 68 750 quintals (135 300 cwt.).

25 386 hectares (62 830 acres) were under hops in Bavaria in 1905; but in 1910 the area had fallen to 17 784 (44 018 acres). This decline has occurred more especially in Central Franconia. The area under hops has also declined in other German States.

This crop is now distributed as follows :

	hectares	acres
Prussia	1158	2866
Württemberg	3400	8415
Baden	1112	2752
Alsace-Lorraine	3989	9872

The total decline in the acreage under hops during the past 15 years in Germany amounts to 18 000 hectares (44 500 acres).

On the other hand 25 000 ha. (62 000 acres) are now under hops in Austria -Hungary. The yield per ha. is also higher in Austria than in Germany.

The countries which purchase most hops are Belgium, the United States and England.

2137 **The Annatto Tree.** (1) (Le Rocouyer). — *Renseignements de l'Office Colonial belge*. No. 5, pp. 184-185, Bruxelles, Mai, 1911.

Belgian Congo

The Annatto is a small tree which grows plentifully in the Belgian Congo ; unfortunately, so far, no use has been made of the reddish-

(1) The Annatto-tree is a bush from 3 to 4 metres (10 to 13 ft.) high, which grows, either wild or cultivated, in the West Indies, Guiana, Columbia, Brazil, and Mexico. It belongs to the family of the *Bixaceae*, and is the *Bixa Orellana* which the French call *Rocouyer* and the Germans *Orleansbaum*. In Italian it goes by several names: « *Orleana* », « *Rocù* », « *terra ariana* », etc,

The seed contains buxine and orelline. Each seed-pod contains from 15 to 20 seeds enveloped in a gummy colouring substance which forms the annatto.

The qualities known to commerce are Cayenne Annatto, West Indian Annatto, Brasilian Annatto, and East Indian Annatto. The colouring matter obtained varies from yellow to deep red. HEUZÉ, *Les plantes industrielles*, Paris, 1893, Tome II; pp. 376-378. (*Ed.*).

yellow die, annatto, which might be used in many ways for colouring food-stuffs and for industrial purposes. The Boma laboratory, in notifying this product, has forwarded to Brussels a series of colouring matters and dyes and fifteen samples of its usage and of products obtained from the Annatto-tree. Its exceptional cheapness and its harmlessness as colouring matter recommend it for food-stuffs. It is said to be excellent as a dye for silks: and for the preparation of dyes which do not fade when exposed to the light, or to acids.

Expert Examination of Vanilla in French Colonies in Oceania 2138

(Expertises des Vanilles dans les Etablissements Français de l'Océanie). — *La Quinzaine Coloniale*, XV. A., No. 12, p. 434. Paris, 25 Juin 1911.

To prevent the exportation of vanilla which might injure the reputation of the Tahiti market, it has been decided to subject all vanilla gathered in the French colonies in Oceania to expert examination (1). **French Oceania**

Vanilla thus examined will be divided into classes. The first will include that of great and average length. The second will comprise that which, though fit for sale, is of inferior quality. It will be strictly forbidden to export any vanilla which would be likely to discredit the Tahiti vanillas.

Defective packing will be a ground for refusing the Government mark, but will not entail prohibition to export.

E. FRANCESCONI and G. SANNA. **Essence of "Hare's Ear,, (*Bupleurum fruticosum L.*)** (Essenza del *Bupleurum fruticosum* Linn). — *Gazzetta Chimica Italiana*, anno XLI, parte I, fasc. IV and V, pp. 395-414. Roma, 27 Giugno 1911. 2139

The plant, the essential oil of which is studied in this article, is an umbellifer, and grows from 1 to 2 m. high (3 ft. 3 in. to 6 ft. 6 in.) with a woody fibrous stalk. It grows wild on waste and barren lands near woods and by the sea shore, in Liguria, Cape Leuca, Corsica, Sardinia and Sicily (2). **Italy. France: Corsica**

(1) See also Abstr. No. 2041 in this *Bulletin*. (*Ed.*).

(2) It is known as *Buplèvre* in France and *Oreja de Liebre* in Spain. See. PH. VAN. TIEGHEM *Eléments de Botanique*, vol. II, p. 553-555, pp. Paris, 1906; and Contessa SAN GIORGIO, *Catalogo Poliglotto delle Piante*, Firenze, 1870. (*Ed.*)

It is plentiful in Sardinia on rocky soil; it forms thickets far from all other vegetation, and gives off a strong, aromatic scent when in flower. When crumpled, the leaves emit a peculiar, persistent odour different from that of the essences of other umbelliferous plants. The scent of the flowers is more delicate.

With the exception of a small quantity of ether and alcohol, the essence consists mainly of hydrocarbons. The density varies according to the portion of the plant whence it is obtained, the stage of growth and the place whence it comes ; nevertheless these variations occur within a minimum limit of 0.8257 and a maximum of 0.8692 at 15° C.

The specific rotatory power varies under like influences from + 45.50° to + 19.72°. The index of refraction varies from 1.4783 to 1.4862. It boils between 167° and 200°.

This essence oxidises readily on contact with the air, turning into a resin; its index of saponification varies between a minimum of 5 and a maximum of 14. It contains no phenols, aldehydes, or ketones.

The quantity of the essence increases with the growth of the plant, and when in full flower it is more plentiful in the flowers than in the leaves.

The density, rotatory power and index of refraction increase during growth and attain a maximum intensity during the period of flowering.

The ether content of the leaves declines as flowering approaches; it is higher in plants that grow at a considerable altitude ; it varies in inverse ratio to the hygrometric condition of the region. The rotatory power varies in inverse ratio to the ether content ; whereas the density varies proportionately to this content. Free alcohol is more plentiful in the flowers than in the leaves, but when the plant is in flower it increases in the leaves in respect of the combined alcohol.

2140 **The Loofah or Vegetable Sponge**. *The Agricultural News*. Vol. X, No. 232, p. 84 — Barbados, March 18, 1911.

The loofah of Egypt, which is often used as a sponge, is the fruit of *Luffa aegyptiaca* Mill, a plant closely related to the vegetable sponge of the West Indies (*Luffa acutangula* Roxb.); the latter is generally seen growing over fences, or over other plants.

Egypt. Barbados

The loofah of commerce consists of the network of fibres existing in the interior of the fruit. The fruits should be allowed to remain on the vines until they have acquired a yellowish tint; but not until they have begun to assume a brown colour, as this indicates that

the outer skin of the gourds is undergoing decay, which will cause the fibrous structure within to become discoloured. The fruits should be cut from the vine with about 2 inches of stem attached, for convenience of hanging. They should be hung in an airy, draughty shed, for two or trhee days, and the outer skin will then be found to be fairly soft and pliant; this stage is assisted by cutting off the tip of the gourd at the lower end, leaving a small hole through which the contained moisture may drip. The loofahs may next be removed by running the finger down the skin of the fruit on one side, splitting it open, and turning out the loofah, which is at once thrown into a washing vat containing lime-water (5lbs. of slaked lime to 60 gallons of water). The loofahs are stirred about in the lime water for a few minutes, and then removed to a draughty shed to dry. Care should be taken to shake the lime water out of each loofah before drying. If the loof ahs are dried too quickly they are apt to become brittle and to crack. They must not, however, remain damp too long, or they may become mouldy; tough the lime prevents this to a large extent, and is, indeed, used in order to protect them from fungoid growths. When the loofahs are dry, the seeds may be easily shaken out of them by hand, and when this is done they are ready for the market.

COCHET-COCHET. **New Garden Varieties of Roses**. (Les nouvelles races horticoles de Rosiers). — *Revue Horticole*, 83e An., No, 13, pp. 308-309. Paris, 1 Juillet, 1911. **2141**

France

First come the Tea Hybrids, which enlarging the number of their varieties and, at the same time, the size of their flowers and the richness of their infinitely varied hues, are thus becoming prime favourites with rose growers. The *Rosa multiflora*, hybridised spontaneously by the pollen of some Indian roses, has given rise to a variety known as the « Dwarf Perpetual Polyantha », of which the charming varieties, so rich in blossom, are now legion, whilst the descendents of *R. multiflora*, which still retain their vine-like branches, refuse absolutely to flower perpetually. These two distinct races of *R. multiflora* have a connecting link in the shape of a kind of Crimson Rambler, both vine-like and perpetual, which goes by the name of « Flower of Fairfield ».

The « Wichura » rose since its introduction in Europe bas been fertilized successfully with many different pollens. Its numerous descendents are very pretty, and though they are not absolutely perpetuals, they flower freely during most of the season.

R. rugosa has been crossed with other breeds. The hybrids of *rugosa* have thus been obtained, and many of the specimens belonging to them are in no respect inferior in beauty of shape and colour to the finest known roses.

Lastly *R. lutea*, which was rightly considered as very unprolific, has begun to seed abundantly and has given rise to the *Pernetiana* variety.

If one reflects on the small number of species hitherto made use of amongst all those of the genus, and when the skill of the growers is considered, one is justified in stating that the list of new varieties of roses is far from being closed.

2142 **The Trade in Cut Flowers in the District of Hamburg** (Le commerce des fleurs fraîches dans la region de Hambourg). *L'Agriculture Commerciale*, VIII An. No. 14, p. 366, Paris, 23 Juillet. 1911.

Hamburg is an important centre for the trade in cut flowers, both as being a populous city and as a centre for reforwarding to the Scandinavian countries and to Russia.

Germany. France. Italy. Holland

The flowers sold in Hamburg come from the south of France, Italy, and Holland. Italy's trade in flowers is chiefly with South Germany, and that in foliage with the North. Holland only deals in bulb-flowers. France is therefore almost alone in supplying the Hamburg market. The season for the sale of cut flowers begins with the first cold weather, and as soon as the chrysanthemums, which are grown on a large scale in the neighbourhood, are over. The season ends in April.

The flowers are forwarded by international parcel post, in parcels weighing 5 kgs. (11 lbs.)

2148 L. GUILLOCHON. **Market Gardening in Tunis.** (La Culture Maraîchère en Tunisie). — *Journal de la Soc. d'Horticulture de France.* Tome XII, 4e Série, pp. 294-298. Paris, Juni, 1911.

The most important centres in Tunis for the raising of early vegetables and fruits, with the exception of the town of Tunis itself, are not near the principal sea-ports as is the case near Algiers and Oran,

Tunis

in Algeria.

Tunis and neighbourhood. — In this district the sudden falls in the winter temperature are very injurious to the cultivation of early vegetables, and compel growers to resort to the market-garden apparatus in use in Europe.

Hammamet and Nabeul. — These two centres, at a few miles distance the one from the other, are the most favourably situated, both

as regards their position at the end of the gulf of Hammamet, the sandy nature of the soil, and the natural protection they enjoy from north winds, for growing vegetables in winter for exportation.

Artichokes are ready for market by November, tomatoes nearly all the year round, French beans from November to April, asparagus from March to May, green-peas and potatoes from November to June.

Porto Farina, near Bizerta. — This is an important centre for potatoes, which are raised by the natives.

Pichon near Kairouan. — The produce is exported from the port of Sussa. Artichokes are to be had all the year round, French-beans from November to April, tomatoes from May to November, asparagus from March to June, green-peas and potatoes from November to May, table grapes from July to October.

Fruit Growing in the Caucasus. (Ueber den Obstbau im Kaukasus) 2144
Export. XXXIII J., No. 29, p. 513. Wien, 20. Juli 1911.

At the last Exhibition at Tiflis some apples from the districts of Batoum and Sukhum arrived in perfect condition; they looked even better than those from the Crimea, which shows that the Caucasian coast of the Black Sea might well compete with other southern lands in this crop. **Russian Empire: Caucasu**

In Transcaucasia also, there has been an enormous development of fruit-growing in the last twenty years. In the districts of Gori and Achalzich (Tiflis Government), the yearly export of fruit, chiefly apples and pears, reaches upwards of 100 000 roubles (£ 10 570). In the Government of Erivan there are 10 000 dessiatines, (27 000 acres), with a yearly crop of 500 000 poods (8 000 tons); Many of the fruits here, particularly some varieties of apricots and peaches, are too soft for carriage ; these are largely dried. In the Government of Elisabethpol, fruit is grown specially in the lower parts; the Nucha district for instance, produces yearly over 300 000 poods (nearly 5 000 tons) of apples, pears, quinces, and peaches, and even more chestnuts and walnuts. The section Ardanutsch of the Artwin district markets 50 000 poods (800 tons) of varions fruits, and over 8 000 (130 tons) of olives. The Batoum district delivers over 60 000 poods (1000 tons) of a great variety of fruits.

Most of the fruits (apples, pears, plums, apricots, peaches and figs) remain in Russian land, only sweet chestnuts and walnuts being exported. These nuts are diminishing in quantity, as the trees, which are the mainstay of the Caucasian forest, are being unmercifully felled. Although the climate is so suitable to them, the fruits are not of good quality, chiefly owing to lack of care and the use of unimproved varie-

ties. The Government is doing its best to improve the fruit-crop by spreading information on culture and distributing improved trees free or at a low price.

2145 **Victorian Fruit Industry.** — *Fruit, Flower and Vegetable Trades' Journal,* Vol. XX, No. 3, p. 67. London, July 15, 1911.

Australia: Victoria

« In 1897 there were 32 000 acres of land under cultivation of orchard fruits in the State of Victoria, Australia. This has now increased to 70 000 acres. In the same period the value of exports of fresh fruits from Victoria, over sea, has increased from £ 5 000 to £ 150 000. Five years ago little or no fruit was sent from Victoria to Continental ports; this season the State is sending over £ 30 000 worth. And yet we are told such progress is but the first stage of development as a fruit-growing country ».

2146 R. EWERT. **Parthenocarpy in Apples and Pears in Relation to Frost and Insect Damage** (Die Jungfernfrüchtigkeit als Schutz der Obstblüte gegen die Folgen von Frost- und Insektenschäden). — *Zeitschr. für Pflanzenkrankh.* XVI B., H. 4, pp. 193-199. Stuttgart, 3. Juni 1911.

Germany

Apart from its importance in the production of fruit without pips, parthenocarpy may play a part in the repairing of damage by frost and insects.

Frost Damage. — Previous investigations by the writer had shown that in the pears " Minister Lucius " and " Fertility " parthenocarpy often occurs; they were consequently specially favourable for investigations on the subject of reparation of frost damage by this means.

" Minister Lucius " was in flower in 1910 from the 24th. of April to the 13th of May; frosts of —3.6°, —1°, and —1.5° C. occurred respectively on the nights of the 24th, 25th, and 29th of April. After the first, frost many of the flowers showed browning of the pistils; and sections through sample flowers showed that this extended to the ovary. The flower-stalks had remained green.

The damaged and undamaged flowers were marked. When they were gathered, on the 5th and 6th of October, each pear was weighed and its pips were counted.

The fruits from flowers with damaged pistils gave the following results:

Sound Pips	Abortive Pips	Average Weight of Fruit
0	0	235.5 gms.
0	8-10	264.0 »
1	6-9	237.5 »
2	6-8	231.2 »
3-4	6	230.0 »

The fruit without any pips formed 14 % of the crop; and, as seen in the above table, their development was about the same as the others. This proportion of 14 % is lower than one would have expected, considering that all the pistils were killed by frost; it is probable, however, that a good many of the carpels escaped damage. That any appreciable number had been fertilized during the twelve hours that the flowers were open before the frost is improbable.

Insect Damage. — A cordon pear of the variety " Fertility " in flower from the 24th of April to the 10th of May, had a good many flowers damaged by the Apple Blossom Weevil; the damaged blossoms were marked, and in every case the weevil reached maturity and escaped. Two of these flowers formed fruits of normal size, only a trifle smaller than a third undamaged one in the same truss.

The conclusions drawn by the writer from his experiments are: Flowers on the same tree are very unequally damaged by frost. In varieties with a tendency to parthenocarpy, frosted blossoms may give as good fruits as undamaged ones.

A distinction should be made between such varieties and those which are really frost-resistant.

Apple-blossom was less susceptible to frost injury than pear-blossom; of the blossoms whose pistils were damaged none produced fruit; this is in accordance with the generally smaller tendency to parthenocarpy of apples. However, Doctorowicz-Hrebnitsky (1) obtained small parthenocarpous apples by removing all but the injured blossoms from the tree.

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(1) DOCTOROWICZ-HREBNITSKY, *Bulletin des Bureau f. angew. Botanik*, 3. Jahrg. 1909, Nr. 4, S. 242 ff. (*Author's note*).

2147 F. WEBER. **A Method of Forcing Woody Plants** (Über die Abkürzung der Ruheperiode der Holzgewächse durch Verletzung der Knospen, beziehungsweise Injektion derselben mit Wasser. Verletzungsmethode). — *Kaiserliche Akademie der Wissenschaften in Wien*, J. 1911, Nr. X.

Austria

1. The writer reports a new treatment for shortening the resting-period of woody plants. The method used is briefly as follows: The buds to be treated are pierced at the base by means of an ordinary medical injection-syringe. The contents of the tube—generally pure spring-water—are then injected into the bud.

2. Buds of *Syringa vulgaris* (Lilac) and *Tilia platyphyllos* (Lime) n the resting stage when treated in this way, were induced to make early growth, so that they were on an average three weeks ahead of untreated ones.

4. For buds of *Tilia platyphyllos* (Lime) it was determined, that wounding by a needle prick, without any subsequent injection had substantially the same effect. « Verletzungsmethode ».

4. With buds of *Fagus sylvatica* (Beech) and *Acer Platanoides* (Norway Maple), injection of water resulted in earlier growth; but not to such an extent as with *Syringa* and *Tilia*.

5. Needle-pricking of the buds, without injection, had no effect on *Acer platanoides* (Norway Maple).

6. Water-injection also shortens the resting-period in the dormant buds (« sitzengebliebene Knospen ») of *Tilia parvifolia*.

7. It is probable that even in the water-injection method, the damage by pricking is the more important factor; though the injection of water into the buds seems to play some special part.

2148 **Grants for the Reconstitution of Vineyards in France** (Subventions pour la Reconstitution du Vignoble en France). — *Journal d'Agriculture pratique*, 75e An. No. 31, p. 132. Paris. 3 Août, 1911.

France

By article 63 of the Finance Act of the 26th of December 1908, the State subsidies for vineyard-reconstitution may be equal to those allotted by the Department, the Commune, or the Agricultural or Viticultural Society in regions where such reconstitution is still in the initial stages.

A decree of the Ministry of Agriculture, under date July 26 1911, has decided that the following Departments come under the scope of this article for 1911, viz. : Aisne, Jura, Haute-Loire, Marne, Meurthe-et-Moselle, Meuse, Vosges.

Nurseries of American Vines in Rumania (Pepinierile de vite americane). — *Journalul Societàtei centrale agricole*, An. XVIII, No. 13, pp. 371-373. Bucuresti, 1 Julie 1911. 2149

At Buftca a nursery of American vines, covering 33 hectares (82 acres), is in full working order. The varieties grown are « Riparia Portalis », « Rupestris Monticola », « Riparia Rupestris » 3306 and 101-14, « Riparia Berlandieri », « Solonis Riparia », « Aramon Rupestris Ganzin No. 1 » and « Mourvèdre Rupestris 1202 ». Rumania

The European vines for grafting on the American stock are carefully selected; the most important of them are « Braghina », « Crâmposia » « Feteasca », « Grasa de Cotuari », « Furmint », « Galhena de Odobesti », « Gordin », « Plavana », « Negru Vârtos », « Cràcanà ». « Coarnà », « Chasselas », « Colombard », « Riesling » (Rhenish and Italian), « Sauvignon », « Bourgogne », and « Malaga »,

Viticulture in Hungary (1). (La viticulture en Hongrie). Report of the French Consul-general at Budapest). — *Feuille d'Informations du Ministère de l'Agriculture*, XVI An., No. 29, p. 24. Paris, 25 juillet 1911. 2150

The area covered by vineyards in Hungary in 1909 was 340 588 hectares (842 955 acres), of which 298 222 ha. (738 100 acres) were in Hungary proper and 42 335 ha. (104 780 acres) in Croatia-Slavonia. Hungary

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(1) « The area of vineyards in Hungary before the phylloxera invasion was 427 000 arpents cadastraux (nearly 800 000 acres); and the annual wine crop reached 5 1/4 million hectolitres (115 million gallons). In general the vineyards are on the hills and on the foothills of the mountains. In the centre and south and even in the north-east, the slopes of the mountains up to 300 m. (nearly 1000 ft.) are everywhere covered with vineyards, and produce generous wines of delicate aroma. Climate, situation, selection of varieties, and cultivation all have a good influence on the quality. The soils on the volcanic rocks are most important in this respect, as shown by the incomparable wines of Tokay, Badacsony, and Somlyò; other rocky soils and alluvial soils are also satisfactory.

« Hungary may be divided into twenty two districts, according to the character of their wines. Firstly, come the slopes of Tokay of world-wide repute for their wine of incomparable quality, which justly merits the name of « King of wines ». The liqueur-wine of Tokay is prepared chiefly from « Furmint » vine; in a favourable year this variety ripens in the first half of October. The grapes are left hanging till they begin to droop and shrivel; those selected for the liqueur-wine are turned into a vat with a small tap at the bottom; a syrupy juice oozes

In 1883 the vineyards in Hungary reached 622 488 arpents (1 155 493 acres); but after the phylloxera invasion, and up to 1909, 478 767 arpents (888 712 acres) were destroyed. To the number remaining, 374 509 arpents (695 183 acres) of reconstituted vineyards should be added.

For reconstitution American seedlings were used; of these, « Riparia Portalis » is the best suited to the country.

In 1909, 61 302 quintaux (6 120 tons) of carbon disulphide were used against the disease.

In 1909 the vintage was 3 792 644 hectolitres (87 918 461 gallons) less than in 1906, namely 4 847 962 hl. (106 752 123 gals.).: or 12.81 hl. per hectare of vineyard (114 gals. per ac.).

At present the Ministry of Agriculture is endeavouring to encourage the exportation of Hungarian wines. It is proposed to create central vaults to be administered by the State.

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out by the pressure of the weight of the grapes. This is the *essence*; after fermenting for several years it forms a much-relished beverage. The true *vin de liqueur* is obtained by mixing the selected grapes remaining in the vat with the must of unselected grapes; according to the number of *puttons* (*putton* = about 3 1/3 gallons) of grapes mixed with a Gönez tun (about 28 ½ gallons) of ordinary must, the liqueur-wine is said to be of 1, 2, etc. to 5 « puttons ».

« In years when the « ausszu » grapes are not numerous enough, they are gathered with the un-withered ones; from these is produced the wine called « szamarodni », a dry and very strong dessert wine.

« Liqueur-wines are produced in smaller quantity in the vineyards of Ruszt-Sopron and in some of those in Transylvania. On the coasts of Arad the « Kadarka » grape yields the red liqueur-wine of Ménes, which has a good aroma and a pleasant taste of cloves.

Other first-class vine-districts are: Badacsony, Somlyó, Nezmély, Érmellék, Ménes-Magyarád and Transylvania, with their scented, alcoholic, bottle-wines; then Eger, Szegszárd, Ménes, and Villany with their excellent red wines: Ménes, owing to its bouquet and fine colour, is considered the best red wine of the country.

As viticulture is one of the most important Hungarian industries, the Minister of Agriculture allotted 2 328 390 crowns (£97 016) for it in the budget of 1900.

Exposition Universelle de 1900 à Paris. Exposition de la Couronne Hongroise. Special Catalogue published by the ROYAL HUNGARIAN COMMISSARIAT, p. 154. Budapest, 1900.

The Budget of the Hungarian Minister of Agriculture reached 50 152 098 crowns (£2 089 671) in 1911. (*Ed.*).

V. Kosinsky. **Comparative Value of Vine-stocks for Grafting and of Direct Producers in Use in Hungary** (Valeur comparée des Portes-greffes et des Producteurs directs employés en Hongrie). — *Le Progrès agricole et viticole*, 28e An., No. 25, pp. 787-790. Montpellier, 18 Juin 1911. 2151

The number of vine-stocks used for grafting in Hungary is very small. Those most in use are the « Riparia » of which the varieties « *Grand Glabre* » and « *Gloire de Montpellier* », (commonly called « *Portalis* ») have supplanted the others. « Riparia » takes the first rank as a stock which resists phylloxera; it is early, regular and very profitable; it takes root splendidly from cuttings, and is readily grafted with the principal native Hungarian varieties. It prefers rich, cool soils, of a loamy description, neither arid nor calcareous. Hungary

In shallow, dry soils, and in calcareous soils the « Rupestris du Lot » is frequently used in Hungarian vineyards; its growth is slow and its leaves fall later than those of any other vine. It resists the attacks of chlorosis and phylloxera fairly well, and the way in which it takes root from cuttings and the readiness with which it accepts grafts leave nothing to be desired. It grows vigorously and requires long pruning and is unsuited to very fertile or damp soils.

The third graft-bearing stock is the « Solonis » which has been found very satisfactory on calcareous and very damp land. « Solonis × Riparia 1616 » of Mr. Couderc is now preferred, as it is very resistant to phylloxera and much more prolific.

Of hybrids the « Berlandieri × Riparia » seems to be the vine best suited to Hungary, in calcareous soils where the moisture is not excessive; it is vigorous, grows rapidly, and is very prolific; « Solonis × Riparia 1616 » seems likely to be the best stock for grafting in damp clayey soils, not too compact and slightly calcareous.

Hardly any direct producers are cultivated on a large scale in Hungarian vineyards.

A. C. Ross (British Consul at Buenos Aires). **The Wine Industry of the Argentine Republic**. — *The Board of Trade Journal*, Vol. LXXIV, pp. 187-188. London, July 27, 1911. 2152

The cultivation of vines is now one of the most profitable industries in the Argentine Republic. The output of wine in 1909 reached 83 600 000 gallons (380 million litres), valued at £ 5 220 000. The area under cultivation is about 173 000 acres (70 000 hectares), as compared with 138 000 ac. (56 000 hectares) three years ago. Argentin

The chief vine provinces are Mendoza and San Juan.

In Mendoza the rainfall is slight, but the water of four rivers is available for irrigation; so far no attempt has been made to store flood-waters.

The native or Creole vine is still cultivated, but European vines now constitute 80 % of those in Mendoza. The vines are trained on horizontal wires about 1 ft. 10 ins. high from the ground. The crop is about 10 or 12 tons of grapes per hectare.

The variations of climate and soil make it possible to produce light and heavy wines similar to those of France, Italy, Spain and Portugal.

2153 J. CHAPELLE. **The Olive-tree in France.** (L'Olivier en France). — *Bulletin Agricole de l'Algérie et de la Tunisie*, 17e An., No. 7, pp. 173-175. Alger-Mustapha, 1er Avril 1911.

Italian and Spanish farmers have not hesitated of late to increase considerably their plantations of olive-trees. This tendency has been carefully fostered by legislative measures.

France

In France, on the other hand, for nearly 50 years past, the century-old olive-yards have been abandoned. Since 1866, from 30 to 35 thousand hectares (74 000 to 86 000 acres) out of a total of 152 000 ha. (376 000 acres) planted to olives, have been abandoned, or a decline of from 70 to 80 % in the value of the oliveyards, formerly estimated at about one thousand million francs (£40 000 000). The value of the annual olive crop has declined by about 40 000 000 francs (£1 600 000). Last April, an appropriation of 2 000 000 frs. (£80 000) was voted, to be awarded in prizes and subsidies to olive growers. French producers are driven by competition to reduce the cost of their produce and to ensure more regular and plentiful crops, and to improve constantly the quality of their oils.

2154 **The Olive-yards of Andalusia.** (Les Oliveraies andalouses). — *Bulletin Mensuel de l'Office des Renseignements Agricoles*, An. X, No. 5, pp. 580-587. Paris, Mai 1911.

Spain: Andalusia

Tertiary and Jurassic chalky soils, argillaceous Silurian schist, and also the grits and drift gravels which cover the lower slopes of the mountains are the soils best suited in Andalusia to the olive.

The most common method of planting in Andalusia is that called "*marco real*", with the trees in squares 9 to 11 metres (30 to 36 ft.) each way, which gives, in the first case, 120 and, in the second, 80 olivetrees per hectare (32 to 48 to the acre).

The area under olives in Andalusia is 794 533 hectares (1 926 740 acres), or more than half of the total area under olives in Spain. The total yield in Spain amounts to 2 500 000 quintals (4 750 000 cwt.); and that of the eight Andalusian provinces to 1 700 000 quintals (3 230 000 cwt.), apart from the fact that Andalusia supplies almost all the table olives.

The selection of varieties and of the system of cultivation to be followed on the plantations, the care taken in cultivating and clearing the land, the manures which fertilise it, the change from the destructive traditional cuttings to scientific pruning, the gathering of the olives at the right time and with the greatest care; all this will suffice to restore to this crop the importance which it should have in Andalusia and in Spain as a whole (1).

In Andalusia the *tachunas*, *lechines*, *zorzalenas*, *verdiales* and *arolas* olives are those which are taken to the mills to be crushed for oil.

The *gordales*, *manzanillas*, *morcales*, *cernezuelos* and other varieties, are used for pickling, or as table olives. The pickling industry is a thriving one, especially in Seville.

J. CHAPELLE. **The Irrigation of Olives in Spain** (2). (L'irrigation des Oliviers en Espagne). — *Journal d'Agriculture pratique*, 75e An., Tome II, No. 28, pp. 40-41. Paris, 13 Juillet 1911; and *Bulletin de l'Office du Gouvernement Général de l'Algérie*, No. 14, pp. 211-212. Paris, 15 Juillet 1911. **2155**

The irrigation of olive-yards as practised in Spain over several thousand hectares, offers the most encouraging example of the wonderful results which can be obtained from the fertilising action of water. **Spain. Tunis**

The olive-yards irrigated during the dry season are wonderfully vigorous and productive. Their biennial yields amount to from 5 to 15 double decalitres (2.75 to 8.25 bushels) of olives per tree, according to size and general condition.

In neighbouring olive-yards on arid land the crop is only a third, sometimes no more than a fifth.

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(1) In 1909, 1 394 858 ha. were under olives in Spain, yielding 2 395 296 quintals of olives. *Essais d'Inventaire de l'Institut Int. d'Agriculture.*

In 1910, 1 396 991 ha. were under olives in Spain, and the yield amounted to 6 133 991 quintals of olives, and 1 017 143 quintals of oil. *The Statesman's Year-Book 1911*, p. 1227. (*Ed.*).

(2) See Abstr. 854, *Bull.* March. 1911. (*Ed.*)

In Tunis, when the Medjerda overflows and inundates the olive-yards, the crop increases to an absolutely astonishing extent.

Olive-trees, which are generally planted on stony soil with a porous sub-soil, can stand very well the effects of running water. The soil should not be saturated too deeply for this crop. The water should not lie on the ground but run rapidly over it. Two different systems of irrigation are used, the one in olive-yards situated on flat land, the other on hilly land.

In the first case, the whole area is irrigated with the help of low banks of earth which divide it into squares of greater or less extent. About 1 000 to 1 500 cu. metres of water per hectare (14 000 to 21 000 cu. ft. per acre) given in two or three irrigations, are required.

When the olives grow on sloping ground, the water is conveyed in ditches running on a slope from one tree to another. The requisite amount of water, which is necessarily less than in the first case, is received at the foot of each tree and detained in a kind of basin until the soil has drunk it all up.

From two to three irrigations are enough. The first should be given at the end of spring, but not when the flowers are in bloom, so as not to disturb fertilisation. The second in July, and the third in August.

In the case of rolling ground, low banks of earth are piled up round each group of trees, in the shape of a crescent or horse-shoe, so as to catch and detain the flowing water.

2156 G. Francolini. **Experiments in Manuring Olives in Italy.** (Dieci anni di esperienze sulla concimazione chimica dell'olivo). — *L'Italia Agricola*, A. XLVIII, No. 10, pp. 229-231 + 2 tabl. Piacenza, 30 Maggio 1911.

The writer considers that the only way to ensure a regular and profitable crop and to restore prosperity to olive-yards which have suffered serious deterioration, is to strengthen the olive-trees by energetic pruning and abundant dressings with chemical fertilisers.

Italy: Latium, Liguria

He describes several experiments made during the past ten years in Latium and Liguria.

Experiments were made with olive-yards which had been entirely neglected, and which had not been cultivated or manured for many years. The experiments were made on the following plan: The olive-trees were thoroughly pruned; and manured with 4 kg. (8.8 lbs.) of basic slag and 1 kg. (2.2 lbs.) of sulphate of potash per tree. These manures were dug into a circular ditch excavated at the

foot of the tree, in which were also buried a large proportion of the branches cut off in the pruning. In the spring, each tree received 1 kg. (2.2 lbs.) of nitrate of soda, which was dug in. The next year, the same manure was given and the foliage of the trees was trimmed. The third year the olives were again manured with half the quantities previously used. The results obtained in Liguria were the following:

1) 17 manured trees yielded 154 kgs. (338 lb.) of olives; 27 other trees on the same lot, which only received a slight dressing of farmyard manure, yielded 40 kgs..

2) manured 20 trees yielded 184 kgs. (405 lb.) of olives; 25 trees, which only received a slight dressing of farm-yard manure, yielded 96 kgs. (211 lb.).

3) 25 manured trees yielded 106 kgs. (233 lb.) of olives; 25 which were only treated with farm-yard manure, yielded none.

4) 10 manured trees yielded 96 kgs. (211 lb.) of olives; 10 which only had a little farm-yard manure gave none (1).

GORRINI (Italian Consul at Trebizond). **The Citrus Fruits of Rizeh Asia Minor.** (Gli agrumi di Rizeh). — *Bollettino del Ministero di Agricoltura, Industria e Commercio*, Serie B., Fasc. 2, pp. 47-49. Roma, 15 Luglio 1911. **2157**

Citrus fruit used to be produced in abundance in Rizeh, where oranges, lemons and tangerines were raised; but now only oranges are grown. These are plentiful and ripen well, though they have a slightly acid flavour. In 1909, Rizeh produced 450 000 kgs. (443 tons) of oranges, of which 292 720 kgs. (288 tons) were exported ; in 1910, 650 000 kgs. (640 tons) of oranges were grown, and 452 516 kgs. (445 tons) exported. Each kg. represents from 6 to 7 oranges, selected for exportation. They are shipped to Russian, Bulgarian, Rumanian, and Turkish ports on the Black Sea. **Asia Minor Rizeh**

During the winter of 1911 the citrus orchards were almost entirely destroyed, only 1 % of the trees being saved. This has inflicted a terrible blow on the Turkish trade in citrus fruit, especially as the orange groves of Syria and Jaffa were also greatly injured last winter.

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(1) See Abstr. 1778, *Bull.* June, 1904.

See also, for experiments made near Pesaro and in the Terra d'Otranto, ERCOLE CASINI. *L'Olivo, sua coltivazione e concimazione*. Legnago, 1904. (*Ed.*).

2158 A MANARESI. **The Fructification of the Peach.** (Sulla biologia floreale del pesco. I Nota). — *Le Stazioni sperimentali agrarie italiane.* Vol. XLIV, F. 3-4, pp. 175-209. Modena, 1911.

Italy: Bologna

Experiments were carried out, over a period of three years, in three hill-side orchards, planted with the « Amsden » variety of peach, and in one irrigated garden, planted with summer and autumn varieties. All these orchards are in the Province of Bologna.

Experiments and observations lead the writer to conclude :

1. The fructification of the peach is closely connected with the vigour of its growth, the progress of the season, and the presence or absence of parasites both when the flower-buds form, during blossoming, and during the growth and ripening of the fruit.

2. The peach is rarely injured by frost in the district under consideration ; there is therefore no need of winter precautions for its protection.

By stripping the bark of the branches in rings, the setting of the fruit is greatly encouraged, and the fruits are larger and ripen more quickly, whilst no injury to the tree results.

4. The leaves and fruit-stalks are also stronger on branches which have been stripped of their bark.

5. It would seem to be unnecessary and even injurious to sulphur during blossoming.

2159 **Apricots in the Balearic Isles.** (Les Abricots aux Baléares). — *Révue scientifique,* 49e An., 2e Sem., No. 3, p. 86. Paris, 15 Juillet 1911.

Spain: Balearic Isles

In the south of France, apricots are chiefly grown for the early market, whereas in Majorca they are cultivated mainly with a view to exporting them dried.

The « Saronjal » variety, which has a very firm pulp, can only be used for preparing syrups and preserves, from which the fibre is eliminated ; the « Pepita dulce » is used for jams and jellies; the « Damasco » and the « Marje » are dried for exporting to London and Hamburg.

Some tons of fruit and kernels are shipped to Marseilles, to supply the markets and confectioners of Provence. The French vice-consul estimates the total exports at an average of from 600 to 700 tons. The apricot orchards increase each year in Majorca.

L. GOBLET. **Plum-Growing in Canada** (La culture du Prunier au Canada). — *Journal des Sociétés Agricoles du Brabant et du Hainaut*, No. 28, p. 335. Bruxelles, 8 Juillet 1911. 2160

Plums are grown on a large scale in the Niagara territory, in the south-west of Ontario, and on the shores of Lake Huron.

Some of the most important experiments made in Canada have been carried out in the cultivation of several varieties, so as to ensure hardiness, high yield in fruit, and other qualities. Canada

One of the best and easiest methods of obtaining new varieties is to sow the stones of the best plums, which have ripened in the district where new varieties are wanted.

The thinning of the plums, on the trees has only been practised of late years.

Jams, jellies and preserves are prepared on a large scale.

F. LESOURD. **French Walnuts.** (Les Noix de France). — *Revue Horticole*, An. 83, No. 13, pp. 310-314. Paris, 1 Juillet 1911. 2161

French walnuts can be classified in three groups : the walnuts of the South-east, of the Centre, and varieties belonging to various regions.

The « Mayette » walnut of the South-east is the finest of all French varieties. It is large and somewhat elongated, broad and flattened at the base. Its dry weight is from 10 to 11 gms. (i. e. 41 to 45 to the lb.) It always fetches a higher price than other varieties. On the other hand it requires fertile soil, and regular and plentiful manuring. France

The « Parisienne » walnut is large, oblong, almost as wide at the top as at the bottom. The shell is semi-hard. The « Franquette » walnut is localised in the department of Isère and does well on dry land. The three varieties above mentioned are known commercially as Grenoble walnuts.

The « de Vourey » walnut only grows in the commune of the Vourey. It is used both as a dessert nut and for crushing for oil. It is gathered very early in the year.

The « Meylanaise » walnut, which is found in some parts of the department of Isère, is large, rounded, and flattened at the base. The « Chabert » walnut, grown in the Isère, flowers late, almost as late as the « Saint-Jean », which it could replace with advantage. It is either small or of average size.

The « Gautheronne » walnut is little grown. The « Petite-ronde» walnut, of the department of the Drôme weighs, when dry, from 6 to 7 grams. (i. e. 65 to 75 to the lb.). The tree flowers late and gives a high yield.

2162 F. N. MEYER. **The Persimmon *(Diospyros Kaki)* in Northern China.** (Agricultural Explorations in the Fruit and Nut Orchards of China). — *U. S. Dept. of Agric., Bureau of Plant Industry, Bull.* 204, pp. 16. Washington, March 25, 1911.

The persimmon (*Diospyros Kaki*) is one of the most important tree fruits in Northern China.

China Certain valleys are entirely given over to its cultivation; and the revenue from the sale of the fruit often forms the main source of income for certain districts. "The most favoured locality for a persimmon orchard is at the foot of a hill, or mountain, with a southern or eastern exposure, where the land consists of a warm decomposed granite soil, that will allow the water to drain off easily, and yet will retain enough to prevent the trees from suffering in case a drought should occur".

All the persimmons in Northern China are ring-budded or grafted on *Diospyros lotus*; a species growing wild on the mountains, and bearing small black fruits full of seeds.

Trees are generally planted 20 to 30 ft. apart. As they are slow growing, peaches and bush cherries (*Prunus tomentosa*) are often grown between them for about twelve years; after this, the soil is regularly cultivated.

The best variety seen by the writer was one with bright orange red fruits, 3 to 5 in. in diameter, and sometimes weighing more than a pound. It is called "Tamopan" in America — an abbreviation of the Chinese name. The fruit is seedless and not astringent, and stands shipping well; it is flattened and with an equatorial constriction, so that it looks like two fruits joined. The trees reach 30 to 50 ft. in height; they generally decline in vigour after 40 or 50 years.

The variety "Lien hua shi tze" or lotus-flower persimmon, has seedless fruits of a bright orange-red colour', of the shape of hot-cross buns, with the addition of the constriction as in the larger variety. This tree grows to 65 or 80 ft. and lives longer than the "Tamopan"; the fruit ripens later, but is more abundant.

There are a great many other varieties; some of the firmer ones are dried, and much resemble dried figs; these can be eaten as they are, or stewed.

The Cocoa-nut Tree and Copra in New Caledonia. (Les Cocos et le Coprah dans la Nouvelle-Calédonie). — *Bulletin de l'Office Colonial*, No. 42, pp. 204-205. Melun, Juin 1911. 2163

The east coast of New Caledonia is especially suited to the cultivation of the cocoa-nut tree, which grows wild, develops without requiring any care, and yields in abundance.

The same is true of the New Hebrides, Loyalty Islands and of the Baaba, Balabio, Taulé and other islands. New Caledonia

New Caledonia has exported of late years 7 000 tons of copra per annum. It might export much more if the cocoa-nut plantations were developed to their full possibilities.

The cocoa-nut tree begins to yield 7 to 9 years after it is planted. « Bud-rot » (1) is unknown on the cocoa-nut trees of New Caledonia.

Cocoa-nut trees with large nuts bear only from 50 to 60; to make 1 kg. of copra 5 or 6 are required. Small-fruited trees bear two to three hundred.

A. MONTOUX. **Storing Fruit.** (Conservation des Fruits). — *L'Agriculture commerciale*, VIII. An., No. 14, pp. 375-376. Paris, 23 Juillet 1911. 2164

Store-rooms for fruit are only satisfactory when they fulfil certain conditions, of which the most important are : a low and constant temperature, absolute darkness, and dryness.

At a temperature above 6° to 7° C. (43° to 44.5° F.), fruit evaporates water and keeps badly. France

Sun-light favours fermentation (2). All draughts should be avoided in a room where fruit is stored, as they also are conducive to fermentation. Damp makes the fruit turn mouldy, and excessive dryness makes it wrinkle. A north aspect should be secured as far as possible for fruit. The store-room should be fitted with horizontal shelves 18 in. deep, and 11 in. apart, from a height of 18 in. from the

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(1) See pp. 368-369, *Bulletin* December 1910.

(2) No real proof has yet been had that light favours fermentation. In the case of alcoholic fermentation light has no special action. See MICHELE GIUNTI, *Influenza che la Elettricità e la Luce esercitano sulla Fermentazione alcoolica. Rendic. Accad. dei Lincei.* Anno CCLXXI, 1883-84, Roma, 1884.

In the case of fermentation caused by bacteria, light is decidedly injurious to the activity of the bacteria, as has been shown by PH. VAN THIEGHEM, DOWNES and BLUNT, DUCLAUX, ARLOING, E. BONARDI and GIUS. GEROSA, by W. MARSHALL WARD and many other experimenters.

See: E. BONARDI e GIUS. GEROSA. *Nuove ricerche intorno all'azione di alcune condizioni fisiche sulla vita dei Microorganismi. Rd. Accad. dei Lincei.* Anno CCLXXXV, 1888, Roma, 1888. (*Ed.*).

(£12.1 *s* per acre), brought in an interest of over 6 %. The writer has no hesitation in saying that this interest would have been much floor up to the ceiling. These shelves should be of open work, each lath being about 1 ½ in. wide ; the laths should be of hard wood, preferably deal. The fruits which are expected to ripen first should be placed in front. They should all be laid on the side which has been least exposed to the sun: *i. e.*, on the least coloured side. Pears should be stood broad-end downwards, and apples on the stem-end.

The fruit keeps better if each specimen is wrapped in tissue paper when stored.

Forestry.

2165 J. J. DE LUZE. **Returns of Forest and Grazing Lands in Switzerland.** (Aufforstung des Staates Waadt am Mont-Chaubert). — *Schweizerische Zeitschrift für Forstwesen*, 62 J., Nr. 7-8, pp. 205-213, + fgs. 3. Bern, Juli-August 1911.

Switzerland : Vaud

This is a study on the yield in timber and money obtained from the cantonal forest of Mont-Chaubert, part of which has been formed by planting old estates and pastures. The plantations, which are almost exclusively of spruce, have been made to protect the soil: the soil and situation are fairly favourable (Jurassic limestone at an average altitude of 1050 m. = 3 445 ft.).

A comparison drawn between the results obtained by reafforestation and the yield of the neighbouring estates used as grazing-lands is of interest. The following are the comparative data :

	Forest	Grazing lands
Present value per ha. . .	Fr. 7933 = £ 317	Fr. 800 = £ 32
Gross returns.	» 200 = » 8	» 40 = » 1.12*s*
Net returns	» 180 = » 7.4*s*	» 25 = » 1.0*s*

(Hectare = 2.4711 acres).

To avoid all exaggeration, the returns for grazing-lands have been estimated at the highest figure sometimes obtained in the country and without charging any interest on the undertaking.

The figures here given show that in spite of the errors committed (planting too close, thinning inadequately and too late), the conversion of grazing-lands into woods may be considered financially successful.

The initial capital invested in reafforestation (land, trees, and interest on annual expenditure at 4 %) amounting to 760 fr. per ha.

higher, 7 % or even 8 %, if the plantations had been less dense, and had been regularly thinned after they were 25 years old.

It should be noted that the first plantations probably date back to 1830, and the first systematic cutting to 1849.

Lastly the writer considers that spruce has acted admirably as a preparatory species for reafforestation; and that no other trees would have given results at all comparable to those obtained with pure spruce.

W. Stavenhagen. **Dunes and their Consolidation.** (Ueber Stranddünen und ihre Befestigung). — *Deutsche Rundschau für Geographie*, XXXIII. J., 10. H., pp. 449-453. Wien, 27. Juni 1911. **2166**

Dunes are formed by the action of violent and persistent sea-winds. The neighbouring crops are always threatened, as dunes tend to extend ever further inland. In this way, on the Prussian sea-coast, near Memel, whole villages have been gradually encroached on.

Last century, a Dane introduced into Prussia a system of defence used in Denmark which Russia afterwards made use of on the Baltic sea coast, and in Turkestan.

Germany. Denmark. Russia

With the exception of work which may be classed under coast defence, dune-making is chiefly the work of the Board of Harbour Works (*Hafenbauinspektion*).

First it is necessary to make « green dunes » (*grüne Vordünen*) in order to protect the plantations on the dunes further inland from the encroachment of the sand. In cases of great need, these green dunes are merely covered with branches, or a low fence of loosely interwoven branches is made directly on the shore.

The summits and slopes of the real dunes are provided with a regular network of loosely woven fences (or hedges), formed of shrubs, which hold up and arrest the sand. *Salix fusca, Berberis, Rosa arvensis* and pine branches are all suitable for the purpose.

Within the meshes of the network are planted *Arundo arenaria, Elymus arenarius* and *Carex arenaria.*

These are followed by *Pinus inops* or *montana*; and when the sand has consolidated, the soil is prepared, and the palisades are removed, *Pinus sylvestris, Pinus picea* (*excelsa* and *alba*) *Betula verrucosa, Alnus glutinosa, Populus tremula* can be planted.

Plants growing naturally on dunes are *Glaux, Cakile, Plantago maritima, Ammophila arenaria, Eryngium maritimum, Hippophae rhamnoides*, etc. (1).

(1) Cp. with: F. Cotton. *Notes on the Works of Sowing and Consolidation of the Dunes of Gascony* etc. Journ. Roy. Agric. Soc. of England, vol. XI, 1895, p. 435. (*Ed.*).

2167 W. WALLEMBÖCK. **Investigations on the Soil Moisture of Forest Land.** (Vergleichende Bodenfeuchtigkeitsbestimmungen in den Streuversuchsflächen des Grossen Föhrenwaldes bei Wiener-Neustadt). — *Centralblatt für das gesamte Forstwesen*. XXXVII. J., 5. H., pp. 197-209. Wien, Mai, 1911. (1).

Austria

The moisture was determined on two experimental areas in the wood of Gross Föhrenwald, near Wiener-Neustadt, both with and without a layer of dead leaves and moss. The cultural experiments previously made by K. Bömerle on the same soil, had shown what an important factor moisture is, and that there are appreciable differences in this respect between covered and bare soil.

The writer's observations show that the essential difference between the moisture in soil covered with a layer of moss and that which is not so covered, depends on the fact that bare land dries more thoroughly and at the same time is more thoroughly saturated with water. This last circumstance is to the advantage of bare lands in years of scanty rain-fall. On mossy soil, the layer of moss does little to prevent evaporation, whilst it greatly hinders the saturation of the soil.

The writer comes to the conclusion that in dry years a layer of moss should be considered as a hindrance to the proper moistening of the soil; and in damp years its action in preventing evaporation is of slight importance. It would thus seem that its drawbacks are more than a set off to its utility in rainy years, when the conditions governing the growth of timber are determined by other factors than moisture.

2168 WALTER. **Exotic Trees in German Forests**. (Anbau fremdländischer Holzarten). — *Allgemeine Forst-und-Jagd-Zeitung*, 87. J., pp. 154-166, 1 tab. Frankfurt a M., Mai, 1911.

Germany: Hesse

For the past 25 years, the forestry administration of the Grand Duchy of Hesse has introduced a number of foreign species of trees. The writer has studied the results obtained.

Deciduous trees. — The most extensively cultivated is the red oak (*Quercus rubra* L.), which grows remarkably well at an altitude of less than 500 m. (1640 ft.), in soil which is sufficiently moist and light. In a deep strong loam containing little humus, 330 m. (1080 ft.) above sea-level, previously occupied by oak-bark coppice, a

(1) See Abstract 867, *Bulletin* March, 1911. (*Ed.*).

plantation 42 years old attained an average height of 17.5 m. (57 ft. 6 in.); and an average diameter breast high of 12 cm. (4.7 in.), corresponding to 280 cu. m. per ha. (3950 cu. ft. per acre).

Walnut trees are valuable for their timber; nevertheless they are only grown in a few favourable localities on the plains, etc., as in the case of *Juglans regia*. Although the American walnuts *J. nigra, J. cinerea, Carya alba*, are not so delicate as *Juglans regia*, they require to be adequately sheltered by pines, birches, larches etc. As a rule, walnuts do well in places suited to fruit trees.

Ten-year-old plantations of *Carya alba* attained a height of 2 m. 50 (8 ft. 2 in.), and after 20 years an average height of 5 m. (16 ft. 5 in.) Ten-year-old *Juglans regia* measured 2 m. 20 (7 ft. 2 in.).

Acer saccharinum was not grown in a favourable locality; and *Acer dasycarpum* and *A. californicum* offer no advantages as forest trees over the native species.

The only advantage of the American ash, as compared to the native ash, is that it stands floods and late frosts better.

Prunus serotina is in no respect superior to the native plum-trees.

Plantations of *Ailanthus glandulosa, Bignonia Catalpa*, and *Zelkova Keaki* have been partially successful.

Conifers. — The variety *viridis* of *Pseudotsuga Douglasii* may be said to be acclimatised, as also *Pinus Strobus*. The finest specimens were obtained in a mixed plantation, on a loamy soil; where trees 53 years old have attained a height of 25 m. (82 ft.), and a diameter breast-high of 33 cm. (13 in.), larger than that of larches and sycamores of the same age. The writer thinks that *Pseudotsuga Douglasii glauca* Mayr is also suited to the conditions prevailing in the Grand Duchy of Hesse. As a rule, the Douglas pine is not suited to dry localities; nor to heavy, impervious, clay soils.

Picea sitchensis is the most generally planted conifer after the green Douglas; and like the latter is well suited for planting up thinnings in mixed plantations of decidous and coniferous trees at all altitudes.

At 530 m. (1740 ft.), on compact soil, specimens of Sitka spruces 19 years old were taller than the green Douglas and the co mmon spruce, and they are less affected by weeds and frosts. Four trees 26 years old, planted on good sand-stone soil, reached 12 m. (39 ft. 4 in.) in height and 16 cm. (6.3 in.) in diameter breast-high.

Larix leptolepis is now well acclimatised; it grows rapidly, especially in the first years, and is used for filling in gaps; and has been found very useful in converting oak-bark coppice. It requires a cool, deep soil where it can develop an abundant root system. On a level cool soil, trees 13 to 14 years old reached a height of

10 to 12 m. (33 to 39 ft.), which is further proof that the Japanese larch grows rapidly in its first twenty years.

The few specimens of *Larix sibirica* which have been introduced are healthy and of normal growth.

Picea pungens is characterised by its slow growth in the first years; it is unaffected by atmospheric disturbances, severe frosts, damp, and the browsing of wild animals. On marshy ground, where the mistake had been made of planting Sitka spruces, *P. pungens* is now grown successfully. Like *P. Engelmanni*, which was introduced along with it, and silver fir, it is not suited to improving plantations, as its growth is slow; it is much valued as an ornamental plant. Eight year-old *Picea pungens* only attains an average height of 1.2 m. (4 ft.).

Picea alba, a very quick-growing tree, but susceptible to late frosts, would be useful for paper pulp.

The writer considers that the good results obtained with *Pinus Banksiana*, and the excellent quality of the timber of *P. sylvestris*, make it inadvisable to grow *P. rigida* except in very special cases.

Pinus Murrayana; *P. montana*, *P. uncinata*, *P. ponderosa* and *P. Griffithii* call for no special remarks.

Seventy-year-old specimens of *Pinus Laricio*, *P. Poiretiana*, grown on a deep clay soil, have attained a diameter breast-high of 38 cm. (15 in.) and an average height of 19 m. (62 ft. 3 in.).

Chamaecyparis Lawsoniana does well on cool, clay soil, with a favourable aspect; when 9 years old it attains an average height of 5 m. (16 ft. 6 ins.). The excellent quality of the timber makes it worth while to plant it in well sheltered groves. *Ch. sitchensis* and *Ch. obtusa* also require a mild climate.

Abies concolor can be grown advantageously. *A. balsamea*, which makes good wood-pulp, grows rapidly at first, but more slowly later on. *A. Nordmanniana*, in spite of its handsome appearance, is not advisable as a forest tree, as it grows very slowly and is not hardy.

Thuya occidentalis grows well in damp soil: *T. gigantea* is much more delicate, though it grows more quickly.

Juniperus virginiana is unsuited to the Grand Duchy of Hesse, as it requires a warm climate and protection against the browsing of wild animals.

Sequoia gigantea was grown from seed; it cannot stand severe cold and requires to be carefully cultivated.

Amongst other varieties of importance as ornamental trees, the writer mentions American oaks and maple-trees, honey-locusts (*Gleditschia* sp.), *Cercidiphyllum*, *Magnolia hypoleuca*, *Zelkova*, *Pinus Cembra*, Cedars, *Abies*, Spruces etc.

E. HOFFMANN. **The Management of Teak and Rubber-Forests in the Dutch East Indies.** (Die Forsteinrichtung in den Djatiwaldungen Javas). — *Naturwissenschaftliche Zeitschrift für Forst-und Landwirtschaft* 9. J., 6 H., pp. 253-269. Stuttgart, Juni, 1911. 2169

Mr. Hoffmann summarises Mr. Wehlburg's report on the organization of Java forests, published at Salaliga, in December 1909, and sent in to the Universal Exhibition of Brussels in 1910.

Dutch East Indies

There are some 450 000 ha. (1 111 000 acres) of « Djati » or teak (*Tectona grandis* L. f.) forests in Java, besides natural forests otherwise utilised.

In 1874 the teak forests were first brought into regular use; and in 1897 they had been scientifically organized, after carrying out the following preliminary works: 1) settling the boundaries, 2) surveying, 3) division, 4) description of the various kinds of trees. In order that the division of the forests should be made on a plan based on a classification of the fertility of the soil, and on the kind of trees, the next step was to determine the capacity in volume of the timber, and to adopt a system of management including a selection plan with natural regeneration in the poorer places; and to clear cutting with natural or artificial regeneration on the better lands. In a plan for systematic management a very important item is the rotation adopted. and the determination of the age classifications. The production of big timber (diameter of the logs 50 cm. (1 ft. 8 ins.) is reserved to the best areas; and for the second best a rotation of 80 years has been fixed; for the third and fourth quality, 100 years; and for the fifth, 120. The plan of management also provides for the utilisation of *Hevea* and *Ficus* trees, which are found in the virgin forests mixed with the teak groves. A calculation has also been made to determine the number of years, or periods, required for reafforestation of the uncultivated or unproductive areas (1).

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(1) A report of the Chief Inspector of Forests, for 1909, shows that great progress has been made in the teak plantations, but; the forests which have not yet been brought under regular management have remained somewhat stationary, though where it has been possible to prevent fires and theft some improvements are recorded for these forests also. In 1909, during the western monsoon season, the total planted area was estimated at 7 325 ha. (18 130 acres), and the out-lay per ha. 42 flor.80 (£1.8*s.* 6*d.* per acre); the figures for the previous year had been respectively 6 552 (16 216 acres) and 45 (£1.10*s.*).

One of the difficulties which have to be met in these plantations is due to invasions of alang-alang (*Imperata arundinacea* Cyr.), a noxious weed, which takes fire during the dry-season and renders the soil impervious and conse-

2170 LEGGE. **Forestry at Creswick, Victoria** (1). — *The Agricultural Gazette of Tasmania*, No. 5, pp. 200-204. Tasmania, May 1911.

Australia: Victoria

Two salient points strike the visitor to the extensive plantations and nursery at Creswick: first, the remarkable amount of work that has been done, and is now in progress there; second, the absence of any public knowledge of it. All cognisance of the zealous labours of the small school at present existing and the far-reaching good soon likely to result from them, is confined to the Forestry Department, and those officials who peruse its reports.

The provisional school, botanic gardens and the *Forest Reserve* are situated on the rising ground of the west, or left bank of the Creswick Creek.

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quently unsuited to the growth of teak. Efforts have been made to replace it by the leguminous plants *Leucaena glauca* Benth., and *Tephrosia* sp., but with little success.

The results obtained by working these forests have been satisfactory. In 1909, 263 039 cu. m. (9 290 000 cu. ft.) of timber were felled, as against 242 039 cu. m. (8 550 000 cu. ft.) for the previous year. The net yield per ha. per annum varied from 27.3 to 28.4 frs. (8*s.* 5*d.* to 9*s.* per acre).

In 1909, 478 300 ha. (1 203 600 acres) had been surveyed, *i. e.* 72 % of all the teak forests of Java and Madura; maps were drawn to a scale of 1: 10 000 and 1: 25 000 for 427 959 ha. (1 059 200 acres).

The cultivation of rubber has also progressed, By the end of 1909 there were:

7 287	ha.	(18 035	acres)	under *Ficus elastica*
911	»	(2 254	»)	» *Hevea brasiliensis.*
52	»	(129	»)	» *Castilloa elastica.*
8 250	hectares	(20 418	acres)	in all.

These plantations are also infested with alang-alang, and here again attempts have been made to grow *Leucaena* and *Tephrosia* between the rubber plants. The total rubber crop in 1909 amounted to 7 123 kg. (15 685 lbs.). In plantations from 7 to 8 years old, the yield per hectare exceeded 34 kg. (31 lbs. per aere).

SALVERDA. (Chef van den Dienst van het Boschwezen). — *Jaarboek van het Department van Landbouw in Nederlandsch. Indie*, 1909, pp. 302-317. Batavia, 1910.

(1) In Victoria, questions connected with forestry are of special interest, considering the possibilities of future development. In 1909, the area of State Forests in Victoria was 3 989 791 acres; 56 039 200 super feet of timber sawn in 1909 in Victoria Saw Mills from Victorian logs were valued at the mill at £189 130. The estimated value of forest production in Victoria, in 1909, was £658 250. *The Statesman's Yearbook for 1191*, p. 302. (*Ed.*).

The State Forest Plantations and Nursery consists of about 1 300 acres. Seven hundred acres form the fine plantations, in which tens of thousands of pine trees with excellent timber boles are now furnishing timber, that works out at £100 per acre.

Three hundred are taken up by the valley with the spacious reservoir recently constructed, numerous extensive arboreta, and some tracts still to be planted, leaving the residue yet to be dealt with as found most advisable.

The arboreta comprise eight sections, planted out to represent the forest flora of distinct and important geographical regions, as follows:

1) Western North America;
2) Western Australia;
3) Eastern North America;
4) Northern and Temperate Asia with Japan;
5) Southern Europe and Mediterranean Region;
6) Eastern Australia and Tasmania;
7) Southern Asia;
8) North and Middle Europe.

In the Australia arboretum, there is as fine collection of wattles; which with the habit of quick growth common to this genus, will soon make an effective show.

The Director gives the palm to *Acacia mollissima* for beauty and economic value.

Forestry along Pennsylvanian Railways. — *Journal of the Royal Society of Arts*, No. 3060, p. 868. London, July 14, 1911. 2171

The Pennsylvania Railroad has conducted forestry operations on a large scale for some years past, and according to the report of the company's forester recently issued, some 4 000 000 trees have been planted in the last nine years, beginning in 1902 with 13 610, and reaching a maximum of 1 054 010 in 1909. The operations cover tracts of land adjacent to various points of the lines east of Pittsburg and Erie, and about thirty-two acres are devoted to nursery purposes at Morrisville, Pa. The company has recently completed two large sleeper and timber-treating plants at Mount Union and Greenwich Point, Pa, which have a combined annual capacity of 1 500 000 sleepers or their equivalent. Although this plant was not put in service until July 1st 1910, the lumber treated during that year included 671 369 sleepers, 4 500 000 feet of lumber and switch timber, 90 306 paving blocks, and considerable quantities of fence-posts, cross-arms, and poles. United States

2172 **Forestry Regulations in French Guiana.** (Réglementation de l'Exploitation Forestière dans la Guyane Française), — *L'Agriculture pratique des pays chauds*, 11ème An., No. 98, pp. 428-433. Paris, Mai 1911.

French Guiana

An order issued at Cayenne on Feb. 20, 1911, regulates the grant of licences for working forests, the rights and duties of owners of licences and the penalties and temporary measures affecting those holding licences previously issued.

Licences are granted to persons of all nationalities who conform to the rules laid down in this order.

It confers the right, subject to reservations mentioned, to exploit trees of all species, with the exception of those which yield latex, or oleaginous seed or kernels, which are subject to special regulations.

Such licences are personal property which can be used and transferred like any other personal estate.

The areas granted under licence for the exploitation of timber vary from 100 to 1000 hectares (247 to 2470 acres).

The owners of forest licences must allow the population of the villages or hamlets the free use of wood for household requirements.

Penalties are enacted against all persons working forests without permission, or who cause forest fires by neglect or malice.

2173 T. Blathey. **Distribution of the Beech in Hungary.** (Horizontale und verticale Verbreitung der Rotbuche in Ungarn). — *Centralblatt für das gesamte Forstwesen*, XXXVII. J., 5. H., pp. 299-221, figs. 4, tab. VI. Wien, Mai 1911.

Hungary

The writer notes that the main problems of geographical forest botany are the following:

1. What are the areas in which the different species of forest trees occur naturally?

2. What are the limits of altitude at which they are found and what circumstances modify these?

On making these enquiries as to the distribution of the beech in Hungary the writer finds:

1. That the beech in Hungary is native to mountainous zones and does not generally grow below a certain altitude; its appearance in the low-lands is exceptional.

2. The predominance of the beech in the North-east Carpathians is not of very ancient date, the beech was preceded by the oak

It is now the prevailing species, and is replacing the spruce in forming the upper forest limit, though at the same time the spruce is spreading in from the North-east.

3. In Hungary, the upper limit of beech woods is 1300 m. (4265 ft·); the few beeches which reach 1340 m. (4400 ft.) are generally met with in spruce woods.

4. A maritime climate tends to lower the level at which the beech grows, whereas a continental climate is very favourable to its rise.

5. Consequently the beech grows at a lower altitude in the North and West; and at a higher one in the South and East of Hungary.

R. Zon and J. M. Briscoe. **Eucalypts in Florida.** — *U. S. Department of Agriculture, Forest Service,* Bull. 87, pp. 47 + tables 20 + pl. V + fg. 1. Washington, April 29, 1911. **2174**

This bulletin contains the result of an investigation to learn what species of eucalypts might be successfully grown in Florida. The study took the form of an investigation of the species already planted and a comparison of conditions with those of regions in which eucalypts have been successfully introduced. **United States**

The eucalypts, as it is known, are natives of Australia and Tasmania, whence they have been introduced into the Mediterranean countries and certain parts of America, particularly Cuba, Hawaii, Brazil and California. As a general rule, the commercial species of eucalypts may be introduced into any region in which citrus fruits and the olive will grow in the open. They do best in a climate which permits of a distinct period of vegetative rest during the year; and are capable of withstanding temperatures below freezing, if the period of low temperature is not long sustained and if it is coincident with the period of vegetative rest. The decisive factor is the absolute maximum and minimum temperatures. Rainfall is of less importance, the trees thriving in regions of 18 to 70 inches (mm. 457-1778).

A comparison of the climatic conditions in Australia and in regions in which eucalypts have been introduced with those in Florida, shows that the climate of Southern Florida below the twenty-ninth parallel of latitude is well adapted to the growing of eucalypts. The climate of Southern Brazil comes closest to that of Florida. In Florida, however, the period of vegetative rest is less pronounced and the atmosphere more humid, and hence freezing temperatures are likely to do greater damage.

As regards soil, most of the eucalypts can thrive on light, sandy soils, provided they are deep and the water table not too low. Where rock or hardpan is close to the surface they fail. The only species which can be safely tried in Florida are either those which can adapt themselves to light, sandy soils; or those which can stand superabundant moisture. Since most of the eucalypts need protection from wind, Florida, possessing no mountain ranges, is not favorably situated.

After a short account of the early introduction of eucalypts into Florida, the species now growing are discussed, mainly from the standpoints of frost hardiness and rate of growth. Of the sixteen species, the five, *E. resinifera*, *rostrata*, *viminalis*, *robusta* and *tereticornis*, seem best adapted to the climate of Florida. But since these eucalypts have been planted as shade trees, or wind breaks, their rate of growth affords an unsafe basis for commercial plans.

The bulletin throughout discourages the present tendency to indiscriminate planting of eucalypts, with the hope of large and speedy returns. The writers explicitly point out that the facts, thus far obtained, prove only that portions of Florida are climatically suitable for growing certain species; and that the feasibility of commercial planting is wholly undetermined. The best methods of culture, the cost of planting, and the returns to be expected can only be settled by trial.

The bulletin closes with a summary of methods of planting, based mostly on Californian experience.

2175 C. Bigot. **The Intensive Cultivation of Palms in Liguria**. (La coltura intensiva delle Palme in Liguria). — *Giornale di Agricoltura della Domenica*, An, XVI, No, 23, p. 220. Piacenza, 4 Giugno, 1911.

Palms are cultivated in Liguria, not only as ornamental plants, but also for their leaves, which are much used by florists and in religious ceremonies.

Italy: Liguria

Three species are cultivated for their leaves : *Phoenix canariensis* Hort., *Chamaerops humilis* Linn., *Cycas revoluta* Thumb.

Phoenix canariensis is the most widely grown, as it is the most hardy and ornamental of all. The soil in which the palms are to be planted is dug three feet deep, and plentifully manured with farmyard manure and other nitrogenous fertilisers. The 3 to 5 year old plants are planted out in June and July, 2 ft., apart each way. They are manured, and the soil dug over once a year; and

irrigated once a month in summer. The outer leaves are cut throughout the year, and sell at from 12 to 20 frs. per hundred.

Chamaerops humilis is cultivated on the same plan; but its leaves, which are palmated, are not suited to all requirements. The young plants must be from 7 to 8 years old before they can be planted out. The leaves sell at from 10 to 12 frs. per hundred.

Cycas revoluta requires greater care; it is of slower growth, and has to be protected by mats against the cold. Plantations are made with what are known as *Cycas* bulbs; these are half buried in very rich soil, well broken up, manured and mixed with peat-mould to increase the proportion of humus. A small crop can be gathered at the end of 2 years, which will go on increasing with abundant dressings of manure. The leaves fetch from 30 to 40 frs. per 100.

The income obtained when the methods above described are employed varies from 0.70 to 1.00 fr. per sq. meter. When the methods in use at Bordighera, which are similar to those used in cultivating the olive, are employed, the income would be 1200 or 1300 frs. per hectare (£19 15*s* to £21 8*s*).

D. Bois. **The Palms of Indo-China.** (Les Palmiers de l'Indo-Chine). — *Revue horticole*, 83e An., No. 14, pp. 320-321. Paris, 16 Juillet 1911. **2176**

The palms now known in Indo-China belong to 24 genera, including 55 principal species and varieties, of which a certain number are new to botanical science.

The new species described by Prof. Odoardo Beccari in his study published in the *Bull. du Museum national d'Histoire Naturelle* (No. 3, p. 148; Paris, 1911) belong to the following genera: *Areca* (1), *Pinanga* (2), *Wallichia* (1), *Didymosperma* (1, with 2 varieties), *Caryota* (1), *Licala* (3), *Rhapis* (3), *Zalaccella* (2), *Pigafettia* (1), *Plectonomia* (1) *Plectocomiopsis* (1), *Daemonorops* (1), *Calamus* (11). **French Indo-China**

Amongst the better known species of interest may be mentioned *Areca Catechu* L. (areca) (1) *Areca triandra*, Roxb; *Oncosperma filamentosa* Blume; *Arenga saccharifera* Lab., a sugar palm of the Malay Archipelago; *Cocos nucifera* L. (Cocoanut); *Nipa fruticans* Thunb.; *Phoenix paludosa* Roxb.; *P. Roebelenii* O'Brien and *P. humilis* Royle; *Corypha elata* Roxb.; *Livistona cochinchinensis* Mart.; *Borassus Flabellifer* L., a sugar palm of Cambodia; *Metroxylon Rumphii* Mart. and

(1) See Abstract 873, *Bulletin* March 1911. (*Ed.*).

Sagus, monocarpic palms from the pith of which sago is extracted by felling the tree before it flowers; *Calamus rudentum* Loureiro, and other species, the stalks of which are exported in large quantities under the designation of rattan and rushes, used as walking-sticks, umbrella handles, and for esparto work and basket making, etc.

2177 P. DIFFLOTH and J. DARTHEZ. **The Utilisation of the Cactus, or Prickly-pear** (1). (Utilisation du Cactus ou Figuier de Barbarie). — *Journal d'Agriculture Pratique*, 75e An., No. 24, pp. 755-757. Paris, 14 Juin, 1011,

There are prickly and thornless cactuses. The first are known as "Kermouss en Nessara" in Algeria and "Hendi" in Tunis. The second go by the name of "Hendi ameles" in Tunis; this is the only desirable variety, except for hedges.

Algeria. Tunis

The plant is exceedingly hardy, growing without any attention and on any soil, except on moist lands, or where there is stagnant water. It prefers dry, rocky soil, arid hill slopes, or mountain sides unsuited to cultivation and even to brush-wood.

It can be planted without clearing the land. The native Africans plough parallel furrows six feet apart; in which they plant prickly pears, at 18 ins. distance the one from the other (an old plant with two shoots growing from it if they wish to get an earlier crop), burying them up to one third of their height, in a hole made with one stroke of the spade. They stamp down the earth round the plant, and that is all.

It is essential that the prickly-pear be planted only when it has lost most of its water. The plants are therefore laid on the ground near the holes, and left there from 15 to 30 days, until the skin wrinkles, and the scar left where the prickly-pear was torn up is quite dry. The use of seed is not advisable.

Crops can only be gathered every second year; and it is therefore advisable to divide a plantation into two sections to be gathered alternately.

The prickly-pear is used as green forage in Africa. Chopped up fine it is readily eaten by camels, goats, etc.; only the shoots of the year are given them.

The prickly pears, which grow plentifully along the shoots of the cactus, are eaten by the natives. These prickly-pears are of

(1) See *Bulletin* Nov. 1910, p. 91, and Abstract 204 of *Bull.* January 1911. (*Ed.*).

the size and shape of a turkey's egg, flattened at each end. When ripe they are of a fine orange-yellow colour and of very agreeable flavour.

Teak-wood Exports from Burma (Birmas Teckholzexport). Austrian Consular Report. — *Das Handelsmuseum*, B. 26, N. 25, p. 390. Wien, 22, Juni, 1911. 2178

After long stagnation, the teak-wood export-trade is reviving in Burma. Forest exploitation becomes increasingly difficult as this tree is only plentiful in forests a long distance inland.

Nevertheless the high price which this timber fetched in 1909-1910 led to the exportation of the following quantities to the countries listed below: British India: Burma

England	26 520	English tons
Ceylon	836	»
Germany	2 651	»
Belgium	810	»
Holland	652	»
Mozambique	1 299	»
India	150 833	»

The Rosin Trade in the United States (L'industrie des Résines aux Etats-Unis). — *L'Agriculture commerciale*, VIII An., No. 14, pp. 368-369. Paris, 23 Juillet, 1911. 2179

In 1910, 555 000 fifty gallon barrels of turpentine were produced in the United States, as against 580 000 in 1909.

1 906 000 barrels of rosin, each containing 500 lbs., were produced in 1910, as against 1 828 000 in 1909.

The production of turpentine has fallen off more especially in the Southern States: the Carolinas, Georgia, Alabama, and Louisiana; whilst the production in the State of Mississipi has greatly increased. United States

The U. S. Department of Commerce and Labor, struck by the constant increase in the demand, both for the home and foreign market, is taking steps to encourage the production of rosin and turpentine.

Conditions seem to be especially favourable to the development of this industry in the United States (1).

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(1) The output of tar, turpentine, and rosin is increasing in Florida. £500 000 worth of rosin and turpentine are annually exported from the port of Pensacola. In 1905, Florida's trade in turpentine and rosin represented a

2180 **Systematic Management of Rubber and Teak Forests in the Dutch East Indies.** — See above, Abstract 2169,

2181 **Development of the Rubber Output of Brazil** (Zur Förderung der Wildkautschukproduction in Brasilien). — *Gummi-Zeitung*, 25 J., N. 37, p. 1394, Berlin, 16. Juni 1911.

The Brasilian Government is considering a report made by the deputy of Para, Dr. Passos Miranda, as to the means for preventing the reduction of the present rubber output; and for facilitating its increase, so that it may compete successfully with the Asiatic product, which is developing to an astonishing extent.

Brazil

For this purpose, the rivers in the rubber regions should be made more easily navigable; the roads should be increased and improved; and colonisation encouraged. All this would entail an expenditure of 150 000 000 frs. (£6 900 000).

2182 G. P. Pogson (British Consul at Parà). **Laws for the Protection and Extension of Rubber Industry in Parà.** — *The Board of Trade Journal.* Vol. LXXIII No. 760, pp. 635-636. London, June 22, 1911.

Three laws, dated 17 th May 1911, have been enacted in the State of Parà for the protection and extension of the rubber industry and trade, and of agriculture generally. The first law authorises the Government to grant favours to persons undertaking to establish at Parà factories for the refining of rubber; or agreeing by means of new and improved methods to wash, rectify and purify indiarubber, so as to permit of the export of one grade only, of the first quality.

Brazil: Parà

The second law authorises the Government to contract a foreign loan, which is to be used to protect the production of rubber. The third law authorises the Government of the State to guarantee

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capital of 2 939 275 dollars, the plant was worth 724 654 dollars and the product 9 901 905 dollars. In Florida alone 15 541 workmen were engaged in this industry.

In Georgia the turpentine and rosin industry employed 11 736 hands; the capital represented was 2 373 880 dollars, cost of materials 1 156 009 dollars, output 7 705 643 dollars.

In South Carolina the turpentine and rosin industries, formerly prosperous, are now losing ground, owing to the exhaustion of suitable timber.

The Statesman's Yearbook for 1911, pp. 424, 425, 428, and 518. (*Ed.*).

a maximum rate of annual interest of 6 per cent., upon a capital of 75 000 000 frs., to be emitted in series during 30 years, to an agricultural mortgage bank, to be founded in the town of Parà.

The Production of Rubber in the "Montaña" of Peru (1) (Kautschukgewinnung in Peru's Montana). — *Gummi-Zeitung*, 25 J., No. 37, p. 1392. Berlin, 16, Juni, 1911. 2183

A Swedish company is now working the rubber plantations in the high zone of the Peruvian Cordilleras, known as Montaña. Peru

To reduce the cost of carriage, which is exorbitantly high, the Company is running motor-boats on the rivers; and has built bridges, known as « oroyas », made of wire cable connecting the two banks, and on which trolley cars are run.

J. Ludewig. **Rubber Cultivation in Mexico** (La culture du Caoutchouc au Mexique). — *La Quinzaine Coloniale*, V. An., No. 13, p. 461, Paris, 10 Juillet 1911. 2184

Mexican rubber is of two kinds, "Guayule", from the north, *Castilloa elastica* from the south.

The latest statistics give the export figure at 5532 tons., distributed over the country as follows: Mexico

Ciudad Juarez	46 772 kg.	46 tons.
Ciudad Porfirio Diaz . . .	2 733 049 »	2690 »
Laredo	116 030 »	114 »
Tampico	2 726 007 »	2683 »
	5 621 858 kg.	5532 tons.

The product is valued at over 40 000 000 fr. (£ 1 600 000).

Castilloa only accounts for 413 315 kg. (407 tons.) of total amount; only 165 000 kg. (162.5 tons.) is obtained from cultivated trees.

Castilloa is grown in three zones: Pelenque and Tabasco, Socomusco (Chiapas), and Tehuantepec.

The total area of the plantations is estimated at about 36 000 hectares (89 000 acres).

Only a small proportion of these trees are now productive. The yields, except in the State of Socomusco, are unsatisfactory; and

(1) See Abstract 879, this *Bulletin* March 1911. (*Ed.*).

it is probable that in many localities cacao, maize, bananas or even sugar-cane would provide more profitable crops.

Some experiments have been made with *Hevea brasiliensis* in Palenque; and with *Manihot Glaziovii* in Yucatan and on the Pacific coast.

" Guayule " supplied 93 % of the total Mexican rubber output. But this will undoubtedly diminish considerably, as the wild plants are decreasing in number and the plantations have not, so far, been as successful as was expected (1).

2185 **Kamerun Rubber** (Ueber den Gummi in Kamerun uud seine Qualitätsverbesserung). — *Gummi-Zeitung*, 25 J., No. 37, pp. 1392-1394. Berlin, 16, Juni 1911.

From 7 to 8 thousand tons of rubber were obtained in 1910 in Kamerun, and the crop this year will be much heavier. The need of improving the quality of this rubber is generally recognized, as the systems of tapping now used by the natives leave much to be desired.

German Africa : Kamerun

As far back as 1894 rules were laid down, with this end in view; but they were not enforced (2).

2186 **The Question of Wide Planting in Rubber**. — *Tropical Life*, No. 5 p. 85. London, May 1911.

Mr. Wickham, who brought the original Parà rubber seeds from the Tapajos plateau, has recently visited Ceylon. He believes that

Ceylon

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(1) See Abstract 1221, *Bull.* April and Abstract 1449 *Bull.* May, 1911. (*Ed.*).

(2) In 1909 the rubber plantation in Kamerun covered an area of 4048 hectares (10 019 acres), as against 2972 ha. (7356 ac.) in 1908. Of this area only 28 ha. (70 ac.) were bringing in returns in 1909. The following data are given for the plantations of the several rubber plants in Kamerun.

Species	Area cultivated hectares	Area cultivated acres	Productive area ha.	Productive area acres	Productive area N. of trees
Ficus	27	66.7	—	—	—
Hevea	988	2441	—	—	—
Kickxia.	3005.50	7423	28	68	18 718
Manihot	28.50	69	—	—	—

328 kg. (722 lbs.) of rubber were obtained in 1909, worth 3395 frs. (£ 124).

In 1908 the plantations owned by natives yielded 1 214 000 kg. (1195 tons.) of rubber, valued at 5 975 000 frs. (£ 239 000); in 1909 the native crop amounted to 1 517 000 kg. (1493 tons.), valued at 9 438 750 frs. (£ 377 550). R. CALDER, *Jahrbuch der Weltwirtschaft*, 1911, p. 289. Jena, 1911. (*Ed.*).

he has converted a large percentage of the Ceylon planters to the view that wider planting would be advantageous to their trees. In almost every place he visited in the Kelvani valley he found that the roots were interlaced. This confirmed him more than ever in his views. He disagrees that close planting saves the weeding bill; and contends that with bigger heads the trees would give denser shade, even if only two and three years old. In Ceylon, hardly anyone has seen the Hevea tree growing under natural conditions, and they do not realize the class of tree it is. In close planting the trees engage in a race skyward, and do not grow big heads with corresponding stems and root areas.

Asked as to the relative strength of the rubber obtained from trees of 20ins. in girth, some of which had reached that size in four years, while others had been growing for eight years, Mr. Wickham expressed the opinion that the strength would be the same; but that the latex of the older trees should be denser, and consequently would have to throw off less moisture — in other words, they would produce more rubber if they produced as much latex.

Cultivation of Castilloa with Cocoa. See above, Abstr. 2132. **2187**

Manuring of Hevea Rubber. — *Tropical Life.* No. 5, P. 88-89. London, May, 1911. **2188**

British Colonies

Although the application of manures is a comparatively recent introduction into rubber plantations, experiments have already shown that their judicious use is followed by good results and improved yields. Experiments have shown that, owing to the application of manures, the flow of latex was more vigorous; and that the coagulation of rubber from this latex took place more promptly.

Unfortunately, on nearly every plantation, the production of farmyard manure and compost, even if all the waste is carefully collected, is insufficient to meet the manurial requirements of the plantations.

Therefore, in order to maintain or to increase the fertility of the soil, the bulk of, if not all, planters must avail themselves of the use of artificial manures; especially as they can be made up to any formula, and to enable the owner or manager to apply just those fertilizing ingredients that are needed.

Nitrogen in a readily available form is supplied by nitrate of soda, nitrate of potash, nitrate of lime, sulphate of ammonia and calcium cyanamide.

The best-known phosphatic manures are super-phosphates and Thomas phosphate powder, or basic slag. The principal potash fertilizers in use are sulphate of potash and muriate of potash.

As to the quantities of fertilizing ingredients to be applied to rubber plantations, this depends not only upon the different requirements of the rubber trees at their various ages, but also upon the condition of the soil.

The artificial manures are to be spread around the trees. Until the young trees reach their fifth or sixth year, it is a better practice to manure them singly, by distributing and forking in the fertilizers around the stem, at a distance of from 1 to 1 ¼ ft. for each year of the tree's growth.

After the sixth year, the soil of a plantation is so thoroughly permeated by the roots of the trees that the artificial manures can be distributed over the whole plantation.

2189 F. Hein and A. Hébert. **Experiments in Scientific Manuring of *Castilloa elastica*** (Essai de Fumure rationnelle de *Castilloa elastica*). — *L'Agriculture pratique des Pays chauds*, II^e An., N. 99, pp. 510-512. Paris, Juin, 1911.

France

The composition of young *Castilloa elastica* seedlings shows that their chief requirements are nitrogen, lime and potash. The amount of fertilising elements withdrawn by 100 seedlings of *Castilloa elastica*, calculated in accordance with the results of analyses and the average weight of a plant, are as follows :

Water	grammes	516.7
Dry matter	»	108.3
Nitrogen	»	2.78
Total Ash	»	14.78
Chlorine	»	0.71
Sulphuric acid	»	0.90
Silica	»	4.55
Phosphoric acid	»	0.56
Alumina	»	0.51
Oxide of iron	»	0.11
Oxide of manganese	»	traces
Lime	»	3.37
Magnesia	»	0.16
Potash	»	1.31
Soda	»	1.22
Carbon dioxide	»	1.38

From these data the following chemical formulae, fully answering to the requirements of 100 young *Castilloa elastica* plants, have been drawn up.

On calcareous soil:

Superphosphates	3.5	to 4	grammes
Kainit	10	to 12	»
Nitrate of soda	18	to 20	»

On soil which is only slightly calcareous:

Basic slag	3.5	to 4	grammes
Kainit	10	to 12	»
Nitrate of soda	18	to 20	»

Experiments made on several lots of plants, grown under identical conditions in the hothouses of the Colonial Garden of Nogent (France), will be made to see if the fertilisers compounded in accordance with these theoretical considerations are of practical use.

FRANK EVANS. ***Castilloa elastica* - Tapping and Yields.** — *Tropical Life*, No. 5, p. 84, London, May, 1911. **2190**

There appears to be great diversity of opinion, both as to the best method of tapping, and the yield obtainable from, the Central American rubber tree (*Castilloa elastica*). In 1908, when the writer carried out experimental tappings on plantations in the Naparima district of Trinidad, good results were obtained with oblique cuts, made with a *Hevea* tapping knife; also with incisions made with an ordinary 2 in. chisel, driven in with a mallet. **Trinidad. Ceylon. Mexico**

In 1910, experiments with pricking instruments were made at the Trinidad Experiment Station: the idea being to puncture the whole surface of the trunks, to a height of 8 to 10 ft. from the ground.

Preliminary tests gave promising results: small punctured areas giving yields amounting to $^3/_4$ to 2 $^3/_4$ lb. dry rubber per tree, at one tapping. The chief drawback to the use of pricking instruments is the difficulty of making clean cuts, the wounds usually being rough-edged, and healing badly.

Another objection is the amount of labour required to continually force in the prickers. But this difficulty could probably be overcome by the use of a portable engine, worked by compressed air, and connected by tubing with the tapping tool.

The apparatus must be light enough to be carried and guided by one man. In 1905 experimental tappings with V-shaped cuts on a few thirteen-year-old trees in the St. Lucia Botanic Gardens,

resulted in an average return of 11.66 oz. per tree. Results in Ceylon appear to be less favourable.

Reports from Mexico show that the yields in that country vary from 3 to 12 oz., according to the age of the trees. The tapping method in most general use is the long V-shaped cut.

2191 SCHRIDOVIK. **Jelutong Rubber.** (La Gomme Jelutong). — *La Quinzaine Coloniale,* XV, An. No. 13, pp. 462-463. Paris, 10 Juillet, 1911.

Borneo: Sarawak. Federated Malay States

The Goebilt factory, in the State of Sarawak (Borneo), exported, in 1910, 12 000 tons of Jelutong rubber. The trees from which it is drawn, which are sometimes of great size (attaining 1 m. 80 in diameter, = almost 6 ft.), belong to the genus *Dyera;* the commonest is *Dyera costula.* They grow in immense numbers in the forests of Borneo and Sumatra, and in certain parts of the Malay States, where it is thought that a production of from 25 to 30 000 tons a year could easily be exceeded. The best known commercial brands are Palembany, Pontianak, and Sarawak. A single tree in Borneo yields, in 40 annual tappings, 50 kg. (110 lbs.) of latex. This is coagulated by means of different substances; and the produce can, and soon will, be considerably improved.

Jelutong latex contains at least 10 % of rubber, or about 3 kg. (6 ½ lbs.) of pure rubber per tree.

The methods of deresination now in use in the workshops of Borneo give excellent results (1).

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(1) Odoardo Beccari, in the information he has collected on guttapercha products of Sarawak, remarks that the Malays designate all milky, viscous or gummy fluids obtained from trees by the name of " Ghettà ". " Djiulutong Ghettà " is a very large tree, fairly widespread in Sarawak, belonging to the family of the *Apocynaceae,* to which Sir J. Hooker gave the name of *Dyera Lowii.*

The bark of the " Djiulutong ", when tapped, produces a large quantity of latex, which the natives use to adulterate Guttapercha. This " Ghettà possesses no elasticity; and although naturally compact it easily becomes resinous and powdery. Nevertheless there is now a demand for " Ghettà ' Djiulutong " on the Singapore market.

ODOARDO BECCARI, *Nelle Foreste di Borneo, Viaggi e Ricerche di un Naturalista,* p. 561. Firenze, 1902. (*Ed.*)

Analyses of "Ceara" Rubber. (Untersuchungs Ergebnisse von Ceara). — *Gummi-Zeitung*, 25 J., N. 42, p. 1608. Berlin, 21. Juli, 1911. 2192

Several specimens of "Ceara" rubber, coming from Ceylon, Uganda, East Africa, Nyasaland, the Sudan, and Southern Nigeria, have been analysed at the British Imperial Institute. Ceylon. Uganda. Nyasaland. Sudan. Nigeria

The results of the analyses were as follows:

Rubber From	Moisture	Pure Rubber	Resin	Protein	Ash
Ceylon	0.9	91.3	3.1	3.4	1.3
Uganda I	4.8	72.8	7.6	11.9	2.9
» II	3.5	86.1	5.7	3.6	1.1
East-Africa (Kibos) insoluble 6.1 and 6.8 %	12.4	58.9	10.5	12.1	2.4
East-Africa (Kismayu) insoluble 6.1 and 6.7 %	10.0	59.8	8.7	13.9	4.0
Nyasaland	4.9 (1)	76.8	10.8	8.4	2.2
Sudan	2.2	80.1	5.8	9.8	2.1
Southern Nigeria (Lagos)	6.4	62.8	3.4	22.4	2.6
» » (Olokemeji)	21.7 (1)	84.1	7.8	6.5	1.6

The Preparation of Rubber (La préparation du Caoutchouc). — *Revue de Madagascar*; 13. An., N. 6, pp. 853-855. Paris, 15 juin, 1911. 2193

The General Government has already drawn attention more than once to the danger of exporting to France badly prepared or adulterated rubber.

The system of running the latex into a little hole, excavated at the foot of the tree which is being tapped, should be entirely abandoned. Madagascar

As a rule, the use of strong coagulating agents should be avoided; they make the rubber very brittle, thus reducing its value. Acids diluted with water should be used to ensure slow coagulation, by which a first class product is obtained. Rubber should be prepared in the shape of flat cakes, from 20 to 25 cm. (8 to 10 ins.) in diameter, and from 10 to 15 mm. (0.4 to 0.6 in.) thick.

It would be desirable to make the natives realize the advantages they would derive from submitting the rubber they have ob-

(1) On lixiviation, these rubbers lose in water and impurities 4.9 % and 21.7 % respectively of their weight; the figures given are those for the analysis of rubber which has been washed and dried.

tained to the inspection of the Administration before selling it. The Administration could avail itself of this opportunity to cut the lumps and thus bring to light any deterioration the product may have suffered.

2194 **The Smoking of Rubber at Singapore.** (L'enfumage du caoutchouc à Singapore). — *La Quinzaine Coloniale*, XV. An., No. 13, p. 461. Paris, 10 Juillet, 1911.

Several methods of smoking have been studied at the Botanical Gardens of Singapore, with a view to obtaining plantation-rubber as similar as possible to the Brazilian rubber known as " Fine Hard Pure Para ", which is the finest quality of Para rubber. The purpose is to obtain a rubber possessing the strength and elasticity of Fine Hard Para, together with the purity of plantation rubber.

Straits Settlements

The Botanical Gardens are on the way to obtaining a rubber of the same quality as the best Para and at the same time freer from impurities.

The following is a comparison between " Fine Hard Para " and the Singapore rubber.

	Fine Hard Para	Smoked Singapore Para
Loss of water	18 %	13 %
Resin	3.5	5.00
Organic matter	1.5	2.03
Ash	0.25	0.38

2195 **Mushroom-beds in France** (La culture du Champignon de couche en France). — *Bull. mens. de l'Office de Renseign. Agricoles*, X. An. N. 6, pp. 702-707. Paris, Juin, 1911.

Agaricus campestris is cultivated in France, in the neighborhood of large towns, such as Paris and Bordeaux, where disused stone-quarries, chalk pits and gypsum quarries are used for this purpose. Attempts have also been made, but without success, to utilise the natural tunnels or caverns in the lime-stone plateau districts in the South of France.

France

Mushroom-beds are also plentiful in the departments of Seine-et-Oise, Oise, Aisne, and Loir-et-Cher and to the east of the Garonne and Gironde rivers. 1 500 labourers are engaged on the mushroom beds near Paris; and when the season is at its height the daily output of mushrooms amounts to 25 000 kgs. (25 metric tons).

Unfortunately this crop is declining, as fungus-parasites, which have not been studied, frequently make their appearance and destroy all the beds in a few months (1).

One " toise " (2) of the raised bed (*meule*) produces on an average 6 kgs. (13 lbs.) of mushrooms; but by carefully selecting the spawn, averages of from 10 to 10.5 kgs. (22 to 23 lbs.) can be obtained. The mushrooms grown in gypsum quarries, which are always very white and fine, fetch the highest price.

In 1906, 3 540 590 kgs. (3 484 tons) of mushrooms from different parts were sold in Paris for 5 948 110 frs. (£238 000).

The French Mushroom-growers' Syndicate estimates the French production at 6 400 000 kgs. (6 300 tons), in which a trade of from 7 to 8 million francs (£280 000 to £320 000) is done.

The great markets for cultivated mushrooms are Paris, England and the preserving factories. Mushroom preserves are prepared at Montrichard (3 100 quintals, = 305 tons, a year), Vendôme (600, = 59 tons), Saint-Aignan, (550 q., = 54 tons), Montoire (200 q., = 20 tons), Morée (100 q. = 10 tons).

In England and the United States, mushrooms are not cultivated, owing to the difficulty in obtaining the right kind of manure; only horse-dung can be used, and one of the chief difficulties which mushroom-growers have to meet is that of obtaining good manure properly prepared. The high cost of labour, and the lack of suitable caves or cellars are also hindrances. Many attempts have been made in the United States, but without success, in spite of the erection of special buildings, cooled and ventilated for intensive production all the year round.

Experiments are now being made in shipping to the United States, in refrigerators, the best qualities of fresh mushrooms, grown in the suburbs of Paris.

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(1) A parasite which frequently attacks cultivated mushrooms in quarries, causing the disease known as " môle ", is assigned to the genus *Hypomeces*, that is, the species *H* (?) *perniciosus*, although the perithecia are not known. It is impossible to raise mushrooms in infected quarries. Besides destroying the " môles " as soon as they appear, the quarry must be thoroughly cleaned, all the hot-bed manure must be removed; and a solution of 2 or 2.5 % lysol must be freely sprayed. DELACROIX and MAUBLANC, *Maladies parasitaires des Plantes cultivées dans les pays chauds*, pp. 336-337. Paris, 1909. (*Ed.*).

(2) The " Toise " is an ancient French measure, equivalent to 1.95 m. (6 ft. 3 in.) in length, still used in mushroom culture. (*Ed.*).

Live Stock Breeding. — Aviculture. Silk Production. — Bee-keeping. — Game and Fisheries. Animal Industries.

2196 **Measures for Encouraging the Control of Tuberculosis in Cattle, in Holland.** — Decree of December 1st, 1910. — *Staatsblad*, No. 364, 1910.

"Art. 1. (1) Cattle-breeders, especially those belonging to associations for the improvement of stock-breeding, are offered State assistance in the control of tuberculosis amongst their cattle, within the limits of the appropriation available for this purpose; and on Holland condition that the cow-houses of such breeders comply with the reasonable requirements of sanitation.

(2) Such assistance may also be given, with the consent of the Minister entrusted with the execution of this decree, and subject to the conditions he may lay down, to other cattle-owners, who must not, however, be dealers.

Art. 2. Applicants for such assistance must fill in a schedule, to be drawn up by the Director General of Agriculture, and send it in to the department. Such schedules will be supplied free of cast, and can be obtained at the offices of all communal secretaries.

Art. 3. Should the application be accepted, the applicants must pledge themselves, in writing, for a period to be determined by the Minister above referred to:

a) to submit all their cattle to the inspection of a special veterinary surgeon for clinical tuberculosis, designated in art. 4;

b) to give the requisite assistance for this purpose;

c) to make over to the State, in return for an indemnity, all cattle found in their establishments affected with clinical tuberculosis, or to slaughter such animals, or have them slaughtered, within eight days of the inspection, and under the supervision of the veterinary surgeon designated under art. 4;

d) to convey, at their own expense, animals taken by the State, to the railway or tramway station or landing stage nearest to the slaughter house appointed for the slaughter, in conformity with the instructions of the veterinary surgeon indicated under art. 4;

e) to thoroughly clean and disinfect the cowhouses occupied by cattle taken by the State, or slaughtered in conformity with the instructions of the veterinary surgeon designated under art. 4;

f) to take all due precautions to ensure their young stock being reared far from all danger of tuberculous infection;

g) to take no additional animals into their establishments, unless they have been examined by the veterinary surgeon designated under art. 4, and certified exempt from all tuberculous symptoms;

h) to refund the cost of examination, established in accordance with a tariff drawn up by the Minister, in case of failure to comply with the preceding regulations.

Art. 4. (1) The examination mentioned in art, 1, letter *a*), will be made at the cost of the State, by veterinary surgeons designated by the Minister.

(2) These veterinary surgeons receive a salary from the Government, and are also allowed travelling and hotel expenses.

(3) They work under the direction of the veterinary inspector for the district, under whose authority they are placed, and in accordance with rules to be drawn up by the Minister.

Art. 5. (1) The district veterinary inspector will be assisted in the work contemplated under art. 4, paragraph 3, by at least two persons, designated by the Minister, who shall form with the inspector an advisory committee, the duties of which will be laid down in an ordinance of the Minister.

(2) The persons referred to in the above paragraph will be allowed travelling expenses by the State.

Art. 6. (1) The veterinary surgeons, referred to under art. 4, will forward through the district veterinary inspector, to the Director General of Agriculture, a report on the examinations they make.

(2) On the strength of this report, the Minister will decide if the State should take over one or more of the animals, to have them slaughtered.

Art. 7. The indemnity referred to under Art. 3, letter *c*, will be reckoned in conformity with a table to be drawn up by the Minister.

Art. 8. (1) Advantage can be taken of the offer made under Art. 1 up to a near date, to be determined.

(2) The decree of Sept. 2. 1904 (*Staatsblad* No. 219) will be abrogated from January 1st, 1911,

Our Minister of Agriculture, Industry and Commerce will be entrusted with the executions of this decree, which will be printed in the *Staatsblad*, and a copy forwarded to the Council of State ".

2197 **Treatment of Foot-and-Mouth Disease.** (Ein brauchbares Mittel bei Behandlung der Maul- und Klauenseuche). — *Zeitschrift der Landwirtschafts-kammer für das Herzogtum Braunschweig*, 80 J. Nr. 16, S. 202. Braunschweig, 21 Juli 1911.

Germany: Brunswick

Treatment with nitric acid for foot-and-mouth disease is here described. For cows two or three table-spoonfuls a day of nitric acid at 15 grs. per litre of water (2 ½ ozs. in 1 gallon) will prevent infection and effect a cure within a week; the hoofs should also be washed, and painted with woodtar; and the udders should be washed with nitric acid at one-third of the above strength, before and after milking.

Pigs and calves should have only one to two table spoonfuls a day.

2198 W. M. Mac Kellar and G. H. Hart. **Eradicating Cattle Ticks in California.** — *U. S. Dep. of Agr., XXVI. Annual Report of the Bureau of Animal Industry*, pp. 283-300. Washington, 1911.

United States: California

As a result of four years' work of the State Officials and of the Bureau of Animal Industry, California has only 9 315 square miles instead of 69 755 square miles of territory in quarantine for Texas fever ticks. Of this area remaining in quarantine a large percentage is at present tick free and should soon be in a condition to be released.

Of the original 153 476 cattle infested, there remain under local quarantine 41 906. This number includes all herds on which the slightest traces of infection have been found in 1910; and many of these will no doubt be free with the close of this season's work.

Half of this number are on one large ranch where eradication work has been slow, on account of its size, the roughness of the range and lack of co-operation from the owner.

Prior to the inauguration of tick eradication in California, condemnations for Texas fever were numerous in the abattoirs having federal inspection. During the past two years, not a single condemnation for this disease has occured in Los Angeles, where the majority of the cattle from the quarantined area are slaughtered. In the past year, deaths from Texas fever on the ranges, where some years back losses annually amounted to thousands of head, have been so few as to be hardly worthy of notice. Experience has proved that tick eradication is not only possible, but with stringent laws and proper methods, is very practicable. When attained, the expenses incurred are fully repaid, both in the case of the individual owner and of the cattle industry at large.

H. H. WING. **The Cause of "Apoplexy" in Winter-Fed Lambs.** (*New-York Cornell Sta. Bull.*, 285, pp. 37-46, figs. 3). *E. S. R.* Vol. XXIV, No. 6, pp. 588. Washington, May 1911. 2199

For several years a disease resembling apoplexy in man has affected lambs being fed in the vicinity of Batavia, N. Y. for the spring market. " In some cases the losses have amounted to a large percentage of the flock. The trouble appears suddenly and does its work quickly. It is sometimes accompanied by paralysis. It nearly always proves fatal, only about 1 or 2 per cent of those afflicted ever having been known to recover. The disease seems to occur only where lambs are being fed heavily; and it then attacks the strongest and most vigorous. Lambs will be feeding nicely and all will seem perfectly well at 12 o'clock; and when the feeder returns at 4 or 5 p. m., one or two of the best lambs will be found dead, appearing to have died without a struggle". United States: New York

Two opinions have been set forward as to its cause. First, that the disease is brought about by feeding an excess of protein in the ration. Second, that the disease is caused by overfeeding. An experiment to determine its cause was combined with a feeding experiment. The results as relating to the cause of the disease and the conclusions drawn are as follows :

" From the observations during this experiment, it would seem that apoplexy is caused rather by sudden overfeeding than from feeding a narrow ration. Three lambs were lost from pen No. 3, which were fed a ration with a nutritive ration of 1:8; while one lamb was lost from pen No. 2, with a ration having a nutritive ration of 1:4.6; and no lambs were lost in pen N. 1, in which the nutritive ration of the ration was 1:5. Furthermore, no lambs were lost from any pen when it was full, except that in pen No. 3, fed a ration having a nutritive ration of 1:8, one lamb was lost when some of the lambs were off feed, thus allowing others to overfeed. In the opinion of the persons who conducted this experiment, there should not be the wholesale loss from overfeeding, that some feeders have experienced, if proper precautions are taken to keep the rack spaces all occupied, and to distribute the grain equally. There may be an occasional sheep that can not stand the heavy feeding necessary for fattening; and there may also be an occasional loss from nervous excitement, which is thought to be one of the causes of apoplexy".

2200 S. SYMONS. **The Poisonous Effects of the Black Bean *Castanospermium australia.* on Cattle.** — *Agricultural Gazette of N. S. W.*, p. 196. Sydney, March 2, 1911..

From time to time there have been reported from the North Coast district of New South Wales deaths amongst cattle as a result of eating the beans of *Castanospermium australe* (Black Bean Tree, or Moreton Bay Chestnut). A post mortem examination of a heifer, which had contracted the habit of eating the bean of *Castanospermium australe*, showed that the blood was pale and the rumen contained a large quantity of the bean. There was inflammation all through the intestines, which was more pronounced in the caecum.

Australia : New South Wales

In the abdominal cavity there were about 2 quarts of dark brown fluid.

An exhaustive analysis of the black bean showed that, amongst other constituents, the fresh bean contains 7.23 per cent of the glucoside saponin, to which the toxic properties of the plant are ascribed.

The beans are extensively eaten by the natives of Brisbane River and other parts of Queensland; but they are always first prepared by steeping them in water for some days, after which they are pounded into coarse meal. The poisonous principle saponin, being very soluble in water, is removed by soaking the beans.

2201 AVIRAGNET. **Dangers and Drawbacks of Milk obtained from Cows fed on Factory Residues.** (*Rep. Pharm.* 1911. 164). — (Dangers et inconvénients du lait des vaches nourries de résidue industriels). — *Annales des Falsifications*, IV année, N. 32, pp. 346-347, Paris Juin, 1911.

On the strength of results obtained by clinical research, the writer declares that milk obtained from cows fed on factory-waste is a cause of digestive troubles in children.

France

A distinction should be drawn between the different kinds of factory-waste used in feeding cows.

The pulp obtained from distilleries and sugar refineries should not be used as food, unless it has been dried.

Malt-husks from breweries are a good feed for cows when they are fresh; when stale they deteriorate and are dangerous.

Oil-seed cakes generally contain toxins which are eliminated in the cow's milk.

Mr Aviragnet is of opinion that they should be absolutely excluded from the rations of cows whose milk is intended for infants or invalids.

Feeding of Cows whose Milk is Intended for Infants. (Alimentation des vaches à lait pour nourissons). — *Journal d'Agriculture pratique*, 75, An., Tome II, N. 29, pp. 77-78. Paris, 20 Juillet 1911. 2202

The Prefect of Police of Berlin has recently published an order prescribing the food which may be given in 1911 to cows whose milk is intended for infants. Germany

It is :

1. Meadow-hay, properly harvested, of good colour and aromatic odour; it must contain only a negligible proportion of poisonous plants or unnutritious grasses, and must be free from mould, dust, and fungi of all kinds.

2. Straw of cereals, free from mouldy smell, and containing no noxious weeds or fungi.

3. Rye and wheat bran of good quality, fresh and unadulterated.

4. Crushed oats, barley and rye of good quality, fresh and unadulterated.

5. Good quality linseed meal.

6. Good quality dried grains.

7. Sugar-beet slices of good quality.

8. Dried potatoes of good quality.

All other cattle-foods are forbidden.

P. Dechambre. **Conditions Essential for Acclimatizing European Live-Stock in the Tropics**, (Les facteurs essentiels de l'Acclimatement du Bétail Européen dans les pays chauds). — *Revue Scientifique*, 49e An., 2e sem., N. 1, pp.7-11. Paris, 1er Juillet, 1911. 2203

A thorough examination of the essential factors of acclimatization, brings to light other conditions, besides that of climate, which play an important part, especially the species and breed of the animals, the rapidity of transport, their new surroundings, and the crossing with native breeds. France

An examination of these different factors of acclimatization shows that domestic species are more cosmopolitan than wild ones. Taken on the whole, they stand the vicissitudes of a change of surroundings with less loss of life and strength.

Each species possesses some breeds which are more adaptable than others; and experience teaches us, for instance, that the Shorthorn breeds of cattle, Merino sheep, Arab horses etc. are breeds which are fairly cosmopolitan.

Improved breeds are not suited to environments where the climate, diet, sanitation, causes of ordinary and contagious diseases, are on the whole unfavourable to stock. Care in the matter of diet, always of such importance, is absolutely essential in the case of animals whose qualities are largely the result of right feeding; and this gives rise to a difficulty which cannot always be easily overcome.

Common unimproved breeds are less exacting than early-maturing breeds; their money value is less; but whilst their yield is proportionately low it is compensated by fewer risks.

In studying the influence of change of climate on stock, we must bear in mind that modern means of transportation are so rapid that the animals find themselves in their new surroundings so soon that they have no time to get gradually accustomed to them on the way.

The influence of the new environment makes itself felt by the effect of the new flora on the diet, by the fauna (insects, *Acaridae*, etc.) and by the climate, especially in the case of high temperature, excessive moisture, etc.

The organic resistance of imported stock is notably reduced by these factors; and the consequence of such a change of environment must be studied; the most important are sterility and disease.

The risk of disease is the most serious danger which the importer of stock has to meet.

Acclimatization is facilitated by placing the animal in good sanitary conditions, by preserving and strengthening its organic resistance, and by controlling disease.

The following precautions should be taken:

The animals should be imported at the most favourable time of year, reducing to a minimum sudden changes of temperature, and making it possible to take advantage of the best diet;

The animals selected for importing should be young and healthy;

Sanitary precautions in the matter of food, drink, housing, covering, and hygiene of the skin should be taken.

Crossing with native breeds is essential to success. Two methods of crossing should be studied: 1, the so-called first-generation-crossing, which often gives immediate good results; 2, continuous crossing, carried on over several generations, with the breed with which the cross is made; this is the real crossing for permanent acclimatization.

Premiums for the Importation of Pedigree Stock in Nicaragua. — 2204
Bulletin of the Pan American Union, p. 943. Washington, May 1911.

For the purpose of encouraging the improvement of native horses, sheep, cattle, and other domestic animals, through the introduction of the best foreign stock, and in order to develop the agricultural and industrial enterprises of the country, a special decree has been issued in Nicaragua. Nicaragua

This grants a premium on each head of live stock introduced into Nicaragua for breeding purposes equal to the sum paid by the importer for freight from the port of origin to that of destination.

If the stock imported comes from a point other than that of embarkation, the premium shall be increased, so as to cover the freight charges from the former place. This premium is in addition to the free entry of live stock into the Republic. The same decree also provides for a premium to any person cultivating foreign products superior in quality to native varieties.

The seeds imported for this purpose shall be admitted free of duty.

HUYPTÉRA (French Consul). **The Cattle of the Mazagan District (Morocco)**. (Le bétail de la région de Mazagan (Maroc). — 2205
Rapports Commerciaux, N. 951, pp. 1-13. Paris, 27 Juillet, 1911.

The only exports of the Mazagan district are farm produce and live-stock. Oxen are the most important of the latter. In 1910, 5 288 oxen, 805 pigs, and 119 sheep were shipped to Tangiers. Morocco
Moreover, the large quantity of cattle driven daily from Doukala to Casablanca and throughout the Chaouia, should reassure all as to the prosperity of the stock-breeding industry in the Mazagan district, where the herds of pigs are also continually increasing (1).

(1) In 1909 the oxen exported from Morocco were valued at £127 183 (3 229 046 fr.); the hides at £283 715 (7 163 804 fr.), and the wool at £133 536 3 371 784 fr.). By adding to this total a sum of £245 433 (6 197 183 fr.) for eggs exported, it will be seen that the trade in animal products, is far the largest part of Morocco's export trade. *The Statesman's Yearbook for* 1911, p. 1025. (*Ed.*).

2206 **Decrease of Horses in Great Britain.** — *Journal of the Royal Society of Arts.* No. 3060, p. 868. London, July 14, 1911.

Great Britain

According to the returns issued by the Board of Agriculture for 1910, the total number of horses in Great Britain used for agricultural purposes (including mares kept for breeding and unbroken horses) was 1 545 376 or 7617 fewer than in 1909.

The total number of cattle of all kinds returned in 1910 was 7 037 327.

Since 1905, when the number of horses reached 1 572 433, there has been a steady decrease at the rate of 13 000 a year. In the census years of 1871 and 1881 there were on the farms of Great Britain 48 horses for every 1000 of population. In 1891 the number was 45, in 1901 41, while in 1910 the proportion of horses was only 38 to every 1000 of the estimated population (1).

2207 E. Reggiani. **The Milk of the Cows of the Modena Iowlands, Italy.** (L'attitudine lattogena delle vacche modenesi di pianura). — *L'Industria lattiera e zootecnica,* An. IX, N. 10 and 11. Reggio Emilia, 15 Maggio e 1° Giugno, 1911.

Italy: Emilia

This study shows that the quantity and quality of the milk drawn in the morning from milch-cows of the Modena breed is superior to that of the evening.

The milk is richer in dry matter, and its density varies in inverse ratio to its butter content. The larger proportion of dry matter, and more especially of fat, in the morning milk, is out of keeping with the many observations recorded in other places; for, as a rule, evening milk has been found to be richer in cream, as is shown by the studies of Malpeaux, de Baldassarre and of de Brioux (2).

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(1) The number of horses is decreasing in Great Britain, but increasing in Ireland.

Year	No. of horses. Great Britain	Ireland
1874	1 311 789	468 089
1904	1 560 236	531 064
1908	1 545 671	533 372
1909	1 552 993	528 806
1910	1 545 287	539 517

The Statesman's Yearbook for 1911, p. 61. (*Ed.*).

(2) See below, Abstr. 2212. (*Ed.*).

CANCURTE. **The Alpine Breed of Goats.** (La Chévre de race alpine). — *Chasse et Pêche*, N. 44, pp. 1000-1001. Bruxelles, 29 Juillet, 1911. 2208

The Alpine breed of goats has a triangular-shaped head. The profile is straight, or slightly dished. The horns, when present, are straight, bent slightly backwards, and slender. The limbs are slender and not very long. These characters hold good for both males and females. Switzerland. Italy

An average sized male goat weighs 60 kgs. (132 lbs.); and a female goat 45 kgs. (99 lbs.). The hair of the male is short (about 3 cm. = 1 ¼ in., long), and glossy. The colour of the hair is sometimes red, sometimes light or dark gray, black, white, and piebald.

The Alpine goat yields from 2 to 3 litres (3 ½ to 5 ¼ pints) of milk a day, and the period of lactation is a long one.

F. PETTI. **Organization of the Milk Trade in Genoa.** (L'organizzazione per la vendita del latte a Genova). — *La Rivista Agraria*, Anno XXI, N. 22, pp. 271-273. Napoli, 4 Giugno, 1911. 2209

The Agricultural Cooperative Association of Genoa has drawn up a well devised plan for proper and hygienic milking, and carriage and storing of milk, and has organized a rigorous system of inspection and control both for producers and dealers. Italy

This Association is constantly developing. Not only does it supply the hospitals with milk and butter; but it has opened a number of milk-shops in the town, at which 10 400 hectolitres (229 000 gals.) of milk and 104 quintals (10 tons 5 cwt.) of butter were sold in 1910. The Association has engaged a veterinary doctor of its own, and has installed a refrigerating plant which can deal with 10 000 litres (2200 gallons) of milk and 300 kgs. (6 cwt.) of butter.

This Association was founded a few years back, with 14 members and a very small capital; it now has a business worth 3 million francs (£120 000) a year.

Encouragement of Dairying Industry in Uruguay. — *The Board of Trade Journal*, No. 764, p. 136. London, July 20, 1911. 2210

A Bill has been brought forward by the Uraguayan Minister of Industries, providing for the encouragement of the dairying industry. It is proposed that the Government be authorised to distribute 500 000 pesos (about £106 000) annually among the farms and creameries that produce the most and the best milk, butter, cream and cheese; and also to promote annual dairy exhibitions. Uruguay

2211 **The Milk Supply of Brussels**, (Consommation de Lait à Bruxelles). — *L'Industrie Laitière belge*, 10e An. N. 6, pp. 44-45. Verviers, Juin, 1911.

Belgium

The Brussels Permanent Milk Commission has ascertained that the population of Brussels receives daily at least 240 000 litres (53 000 gallons) of milk, representing a value exceeding 60 000 frs. (£2 400) or 22 000 000 frs. (£880 000) per year. It is now studying the conditions to which cow-houses should be required to conform in future, and the improvement which should be introduced to insure the hygienic state of the milk.

2212 **Difference in the Amount of Fat in Morning and Evening Milk owing to Unequal Intervals of Milking.** — *The Journal of the Board of Agriculture*. No. 4, p. 334. London, July 1911.

Great Britain

It is well known that afternoon milk is richer in fat than morning milk and that this difference is largely, if not wholly, due to the shorter time from the morning to the afternoon milking.

Mr. S. H. Collins has collected together the results of a large number of investigations of the composition of milk in order to find the amount of difference in the proportion of fat that is caused by various intervals between the milkings.

The results arrived at are as follows:

Interval between milkings.	*Difference in milk.*
12 and 12 hours — *e. g.* 6 a. m. and 6 p. m.	— Morning milk richer in fat than evening milk by 0.18 per cent.
13 and 11 hours — *e. g.* 6 a. m. and 5 p. m.	— Evening milk richer than morning milk by 0.33 per cent.
14 and 10 hours — *e. g.* 6 a. m. and 4 p. m.	— Do, by 0.70 per cent.
14 ½ and 9½ hours — *e. g.* 6 a m. and 3.30 p. m.	— Do, by 1.09 per cent.

On the average, if a herd be milked 12 minutes earlier in the morning and 12 minutes later in the evening, the milk will be richer in fat by 0.1 per cent. in the morning and correspondingly poorer in the evening (1).

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(1) See also Abstr. 2207. (*Ed.*).

L. Stoecklin. **The Cryoscopic Examination of Milk.** (La Cryoscopie du Lait). — *Annales des falsifications*, IVe An., N. 31, pp. 232-257. Paris, 31 Mai, 1911. 2213

The cryoscopic examination of milk has been much recommended of late; but many of the observations made are inconclusive and often even contradictory, owing to the precautions with which such investigations have to be surrounded. France

The chemical composition of milk varies within very wide limits; so that little success has attended the attempt to establish the average composition of "normal" milk, to serve as a term of comparison in milk analyses.

Whilst the chemical composition of milk is so variable, it possesses fairly stable physical properties, which may be fairly designated as the "physical constants of milk".

The more important of these physical constant are:

1. Freezing-point, F.P. (Cryoscopy).
2. Index of refraction, I.R. (Refractometry) (1).
3. Electrical conductivity, E.C. (Measure of electrical resistance).
4. Density, D. (Densimetry) (2).

All the fluids in animal or human organisms, blood, serum, milk, etc., are isotonic i.e. they have the same osmotic pressure. On the other hand, it is known that the osmotic pressure is proportional to the coefficient of the lowering of the freezing-point, F.P.

Milk, when fresh, from whatever kind of cow it be obtained, whether of good or poor breed, and from whatever country, from cows kept in stables or in the open, whether well fed or not, whether milked soon or late after calving, in summer or winter, morning or evening, whether the supply be scanty or plentiful, always freezes at or very near to — 0.55° C., though its chemical composition may vary vastly under the diverse influences above mentioned, even to the extent of doubling in the case of certain ingredients. One condition only is indispensable, the cow must be healthy; as certain pathological states destroy the osmotic equilibrium of the fluids of the organism, thus altering their F.P.

The constancy of F.P. and the use of this factor has been the subject of discussion, as experimenters found: 1, that the initial freezing point (I.F.P.) of freshly drawn milk is not stable; 2, that the use of antiseptics to preserve the milk for analysis falsifies the

(1) See Abstract 1471. *Bull.* May 1911.
(2) » » 1247, » April, 1911. (*Ed.*).

results; 3, that the determination of the F.P. is too delicate an operation to allow of its entering into common practice.

Systematic investigations, made by the writer, show that in spite of these different factors a constant ratio still exists in the variations of the F.P.; and that it is possible to distinguish by this means pure from watered milk.

By adopting the corrections suggested by the writer in this study and summarised by him in practical formulae, specially applicable to the cryoscopic examination of milk, the determination of the qualities of milk, on the basis of its I.F.P., becomes a simple matter of mathematical calculation.

We refer the reader to the detailed account of the method of determining the freezing point; and to the calculations which lead to the corrective formulae.

Here is an instance of a calculation, in which all the practical corrections find their place:

Bichromated milk containing 1.1 bichromate of potash per litre, showing by titration 3.5 gr. of total acidity as lactic acid.

Result of cryoscopic examination:

Reading of the thermometer	— 0.520° C°	
Zero of the thermometer	— 0.030°	
Ascertained freezing point		— 0.490°
Real lactic acid $3.5 - (1.20 + 1.1 \times 0.61) =$	1.73	
Correction due to lactic acid $1.73 \times 0.050 =$	— 0.0865°	
Correction due to bichromate $1.1 \times 0.018 =$	— 0.0198°	
Total correction		— 0.106°
Freezing point, I.F.P.		— 0.384°

$$\text{Watering} = 100 - \frac{0.384}{0.550} \times 100 = 30\,\%$$

The writer insists that of all the tests used in the ordinary analysis of milk, none is so simple, rapid, and reliable for purposes of interpretation.

2214 N. FAVILLI. **Electrical Resistance of Milk as a Test for Watering.** (Sulla ricerca dell'acqua aggiunta al latte mediante la determinazione della resistività). — *Rivista Scientifica del latte*, An. I, Fasc. II, pp. 33-34. Reggio Emilia, Giugno, 1911.

Electrical resistance is one of the physical constants, to which attention has lately been called, as likely to prove of value in **Italy** detecting the adulteration of milk by watering,

A series of investigations, made by Mr. Favilli at the Institute of Zootechnics and Veterinary Hygiene at Pisa, lead to a different

conclusion. Resistance varies too considerably according to the breed, individual constitution, and diet of the cow from which the milk is obtained, Resistance varies moreover with the nature of the water used for watering. For these reasons this test cannot be of use in detecting watering of milk.

L. A. Rogers. **Fermented Milks.** — *U. S. Dep. of Agr.; XXVI Annual of Bureau of Animal Industry*, pp. 133-161. Washington, 1911. **2215**

Within recent years there has been a rapidly growing interest in the therapeutic value of buttermilk and other fermented milks, such as yoghurt, kefir, koumiss etc. **United States**

Fermented milks are now recommended when a nutritious and digestible food is essential; but it is in the treatment of disorders resulting from toxic action that their chief value is supposed to lie. The advocates of the use of sour milk have used for the most part in their experimental work a peculiar bacterium, which forms an exceptionally high percentage of acid, and which is said to be particularly adapted to acclimatization in the intestines. This micro-organism is generally known as the Metchnikoff bacillus, the bacillus of Massol or *Bacillus bulgaricus;* or *Bacterium caucasicum* as proposed by Beyerinck. The action of this organism on milk distinguishes it from all other known bacteria. At the optimum temperature milk is curdled in a few hours with a rather soft curd, frequently somewhat slimy, which does not separate from the whey even on long standing.

In 24 hours the milk may show an acidity equivalent to nearly 2 per cent of lactic acid. On standing several days this may become about 3 %.

The most active of the ordinary lactic acid bacteria seldom produce more than 1 per cent lactic acid. The more active type of *Bacterium caucasicum* forms the inactive lactic acid, while the laevo-rotatory acid is produced by the type which forms acid more slowly.

Yoghurt buttermilk is now sold in several cities; and the growing demand will doubtless soon extend its manufacture more generally. In the United States better results are secured by using with the *Bact. caucasicum* a culture of an ordinary lactic-acid organism, such as is used in making buttermilk.

Bact. caucasicum, growing alone in milk, forms usually a rather slimy tenacious curd; which cannot be broken up into the smooth creamy condition, essential to a good buttermilk. If this organism is grown in combination with the ordinary lactic-acid organism, a more friable curd is obtained, and the sliminess is not so evident.

The two organisms can be carried in mixed culture only with great difficulty, as the high acid soon suppresses the ordinary form.

The most satisfactory results can be obtained by making buttermilk in the ordinary way, and churning it with an equal quantity of milk curdled with the yoghurt organism. This method gives the desirable texture of buttermilk and a distinctive flavor. If a pure culture can be obtained, yoghurt can be made in the home with little difficulty; but if it is not kept cold the acidity will continue to develop, until it becomes unpalatable.

2216 **Swiss Exportation of Condensed Milk.** (U. S. Consular Reports). — *The Canner and Dried Fruit Packer*, No. 859, p. 11. Chicago, July 13, 1911,

Switzerland exported condensed milk last year to the value of about 30 000 000 francs, (£1 200 000), as compared with 28 000 000 (£1 120 000) in 1909. England is the largest buyer of the Swiss product; but many of the exports credited to Great Britain are reexported to the colonies. Because of the trade agreement between the manufacturers of condensed milk in the United States and Switzerland, no attempt is made to export to America. In recent years the interests of the continental concerns have been combined under the name of the *Nestlé-Anglo-Swiss Condensed Milk Company*, and operated under one general management. This has given the company almost a complete monopoly of the business in England and Europe, where they have a number of factories.

Switzerland

2217 G. M. WHITAKER. **The Extra Cost of Producing Clean Milk.** — *U. S. Dept. of Agric., Bureau of Animal Industry, Circ.* 170, pp. 119-131, + 1 fig. + pl. IV. Washington, 1911.

In considering the question of the expense entailed by additional precautions of cleanliness in milking and handling milk, the writer uses as a basis a dairying score-card, much used by dairy and health authorities in the United States.

United States

DAIRY SCORE CARD.

I. *Equipment.*

Cows.

Healthy (apparently in good health, 1; tuberculin test, once a year and no cases found; or twice a year and tuberculous animals removed, 5)	6
Comfort (bedding, 1; temperature of stable, 1)	2
Food (clean and wholesome)	2
Water (clean and fresh, 1; convenient and abundant, 1)	2

Stables.

Location (well drained, 1; free from contaminating surroundings, 1)	2
Construction (tight, sound floor and proper gutter, 2; smooth, tight walls and ceiling, 1; proper stall, tie, and manger, 1)	4
Light (1 point for each sq. ft. of glass per cow, up to 4)	4
Ventilation (automatic system)	3
Space per cow (500 to 1000 cu. ft.)	3

Utensils.

Construction and condition of utensils	1
Water for cleaning (clean, convenient and abundant)	1
Small-top milking pail	3
Facilities for hot water or steam (in milk house, not in kitchen)	1
Milk cooler	1
Clean milking suits	1

Milk room.

Location (free from contaminating surroundings, 1; convenient, 1)	2
Construction (floor, walls, and ceiling, 1; light, ventilation, screens, 1)	2
Total for equipment	40

II. *Methods.*

Cows.

Cleanliness	8

Stables.

Cleanliness (floor, 2; walls, 1; ceiling and ledges, 1; mangers and partitions, 1; window 1)	6
Stable air at milking time	6
Barnyard, clean and well drained	2
Removal of manure daily to field or proper pit	2

Milk room.

Cleanliness	3

Utensils and milking.

Care and cleanliness of utensils (thoroughly washed, and sterilised in live steam for 30 minutes, 5 [or washed and placed over steam jet, 4; or scalded with boiling water, 3; or not scalded, 2]; inverted in pure air, 3) . .	8
Cleanliness of milking (clean, dry hands, 3; udders washed and dried, 6 [or cleaned with moist cloth, 4; or cleaned with dry cloth, 15 minutes before milking, 1])	9

Handling the milk.

Cleanliness of attendants	1
Milk removed immediately from stable	2
Prompt cooling (immediately after milking each cow) . .	2
Efficient cooling (below 50° F., 5; 51° to 55°, 4; 56° to 60°, 2)	5
Storage (below 50° F., 3; 51° to 55°, 2; 56° to 60°, 1) . .	3
Transportation (iced in summer, 3; jacket or wet blanket. 2; dry blanket or covered wagon, 1)	3
Total for methods . . .	60

The writer next considers what minimum standard should be reached by every milk producer. This he puts at 42 points, made up as follows: healthy cows, wholesome feed, plenty of clean and fresh water, and comfortable quarters, 12: moderate cleanliness of cows, 4; light and ventilation of sheds, 5; cleanliness of sheds, 6; removal of manure, 2; clean clothing of milkers, 1; washing and draining of pails and cans, 5; clean milking, 3; removal and immediate cooling of milk, 3; covering of cans, 1.

To gain extra points in management, the writer considers the following time would be required for a herd of 15 cows:

	Minutes per day per cow	Additional points gained
Cleanliness of cows	5	3
Cleanliness of stable and air .	3	4
Cleanlines of milk-house . . .	2	2
Scalding utensils	1	2
Wiping udders	2	4
Removal of milk	2	1
Total . . .	15	16

With labour at 20 cents (10*d.*) an hour, these extra 16 points will cost 5 cents (2½*d.*) per day per cow.

By the use of ice 6 more points may be gained. Reckoning one third of the score for construction will and another 6 points: at an expense varying from nothing up to 5 ½ cents, in extreme cases.

The extra care and vigilance of the proprietor may be charged at 5 cents.

Thus, to bring the score from 42 to 70, the outside figure for expense will be 15 ½ cents (7 ¼*d*.) per day per cow.

The product of a cow per day ranges from 5 to 12 quarts a day: so the labour would be ½ to 1 cent per quart extra, and the extreme cost of new materials and construction another 1 to 2 cents; the total extra cost may be taken as 1 ½ to 3 cents (¾ to 1 ½*d*.) per quart according to the yield of the cows.

The writer considers that milk produced under such conditions should command at least 2 cents (1*d*.) per quart more than that produced under slovenly conditions.

ARDOUIN-DUMAZET. **The " Fourmes du Forez " and " d'Ambert " Cheeses.** (Les Fourmes du Forez et d'Ambert). — *Journal d'Agriculture pratique*, 75e An., No. 26, pp. 811-813. Paris, 29 Juin, 1911. **2218**

A cylindrical cheese, about 25 cm. (10 ins.) long and from 12 to 14 (5 to 5 ½ ins.) wide, is known by the name of " Fourme d'Ambert ", or " Fourme du Forez ". This cheese is made in the district lying between the Puy de Dôme and the town of Montbrison: a district no wider from east to west than 10 km. (6 miles), and extending in length from north to south 30 km. (18 ½ miles). There are some 10 000 cows in this district, of which 4 000 belong to the Department of the Loire. **France**

The cattle are generally taken at the end of May up to the " *jasseries* " (summer huts or châlets). Each herd consists of from 15 to 25 cows. The low altitude allows of constant intercourse with the village, to which the cream and butter are taken daily.

The dairy methods in use are still primitive, in spite of the efforts of large land-owners; and the " fourmes " vary so much in quality that barely one tenth are fit for export trade. They are consumed almost exclusively in the district where they are made; this is all the more regrettable as there is a considerable demand for " blue cheese " on the markets of Lyons, Marseilles, and St. Etienne.

The " fourmes " are moulded in cylindrical shaped tins. When compact enough, they are stored near the ceiling of the hut in wooden troughs, where they remain from 15 to 30 days. Next they

are placed in a room to ripen and dry; and are left there for a considerable length of time, according to the season, before being subjected to a last and curious method of ripening. In this, the " fourmes " are placed on the ground in a cellar and covered with earth; over the layer of cheese spring-water is made to flow, so as to keep the temperature constantly cool. Unfortunately this water is not thoroughly drained off; it lies stagnant; the earth gets mouldy, and the cheeses loose their qualities.

The " fourme d'Ambert " or " Forez " keeps for a long time. The appearance of the inside cuts of this cheese and its taste are similar to those of Roquefort and Gorgonzola. It is not so dry as similar cheeses from the south-west, known as " Septmoncel " and " Sassenage ".

2219 CARLO BESANA. **The Cheese Industry in Southern Italy and its Future.** (Il Caseificio meridionale e il suo avvenire). — *L'Industria lattiera e zootecnica,* An. IX, No. 14. pp. 220-221. Reggio Emilia, Luglio, 1911.

In numbers 10 to 14 of the *Industria Lattiera* C. Besana examines the conditions of the cheese industry in Southern Italy and comes to the following conclusions :

Italy If the cheese industry in South Italy is to be encouraged and rendered more profitable.

1) Cow's milk must be used for the " *caciocavalli* " ; the round shaped of this kind of cheese, known as " *provoloni* " should serve as table cheese; whilst the pear-shape must be given only to cheese for grating.

2) Ewe's milk should be reserved for the preparation of " *pecorino* " cheese of the Roman variety, as there is a good market for this cheese as an article of popular consumption, and it enjoys a high reputation abroad.

3) Cheese-making should be concentrated in the smallest possible number of dairies, to be organized possibly on a co-operative basis.

4) Genuine products should by protected against fraud by registered trade-marks.

5) The travelling teachers of Agriculture should be furnished with the requisite outfit for instructing in cheese making, and expert cheese-makers should be appointed as teachers.

6) Prize competitions should be organized, and awards given for the foundation of co-operative dairies in the south of Italy; special shows should be periodically held in the several producing centres.

J. Ten Broeck Bowles. **Treatment of Creamery Waste, or Sewage by the Septic Tank Process.** — *The Journal of Industrial and Engineering Chemistry*. Vol. 3, No. 6, pp. 400-403. Easton, Pa., June, 1911. 2220

In the manufacture of butter and cheese there is a comparatively large amount of waste product, part of which can be returned to the farmer for stock-feeding, but a considerable amount cannot be so disposed of, and it is liable to create a nuisance when discharged into a stream, or run upon land. United States

The question of how creamery waste can be disposed of, so as not to create a nuisance, is therefore one of considerable importance; and although some work has been done on this subject in Europe and America, the best method of treating such waste is a problem that still remains to be solved. The present investigation was undertaken for the purpose of throwing some light upon the subject.

From the study of creamery sewage disposal in septic tanks the following results are obtained:

1. The septic tank, when the sewage remains in it six days, will liquefy and decompose the solid particles in the creamery sewage.

2. Allowing the sewage to remain in the tank six days gives a reduction of sixty to sixty-five per cent. of the organic matter.

3. The creamery sewage must remain in the tank much longer than municipal sewage. There are many lactic organisms at work, which keep the putrefactive organisms from growing; just as soon as the lactic acid organisms have acted upon all the sugar, these organisms will not be as active as formerly, and putrefactive bacteria will commence to grow.

4. When the sewage is allowed to remain in the tank six days, a stable effluent is obtained with no putrid odour.

5. If a creamery were so situated that it would be impossible to turn the effluent into a stream, then the effluent would have to be run on to a pasture or field near by, or on to gravel beds. Care must be used in turning the effluent on to gravel beds, as there is some liability of contaminating the creamery well water with the sewage.

6. When a creamery has only a small septic tank, then filter beds should be used to further purify the effluent.

7. Cleaning of the septic tank and filter beds will depend upon the amount of flow, and should be attended to whenever the effluent deteriorates.

The writer concludes that:

1) The septic tank will dispose cheaply of creamery waste.

2) Septic tanks are applicable to both large and small creameries.

2221

G. ANDERSON. **On the Need of International Regulations for the Inspection of Meat.** (Sur la nécessité d'un règlement international pour l'inspection de la viande). — *Bull. mensuel de l'Association international du froid*, 2e An., T. II, Nos. 2-3 (Nos. 13-14), pp. 78-89. Paris, 1911 (1).

After showing the importance of the inspection of meat to the refrigerating industry, Mr. Anderson points out that the importance of the cold storage industry is intimately connected with the preservation of butcher's meat. If it had not been for the need of opening the markets of Great Britain to the cattle of the southern hemisphere cold storage would never have attained its present importance,

Australia: N. Zealand. S. American Republics

On the other hand, it is in the interest of the vast colonial Empire of Great Britain to ensure an outlet on the markets of Europe and North America for the products of Australia and New Zealand. Like interests induce the South American Republics to ensure the best conditions for the carriage and sale of their frozen meats, which will soon be a necessity for Europe and the United States.

It is therefore a matter of prime importance to combine the requirements of commerce with those of hygiene, and with the tastes and requirements of the several importing countries.

With this end in view, the first thing is to see that all due precautions are taken in slaughtering, and in preparing the meat for expotation, to ensure its being sound and of good quality.

Uniform and severe rules for the inspection of meat, enforced in the export countries, under the control of the Governments of the Australian Federation, New Zealand, and the South American Republics, would already be a great step forward in the right direction.

The low price of meat in the exporting countries would make it possible to enforce severe rules for inspection. It would thus be easy to eliminate all animals unfit for food, their carcases being used instead in the manufacture of tallow and manures.

When once good sound meat, of a thoroughly trustworthy quality was thus ensured, international regulations, based on this

(1) See Abstr. 916, *Bull.* March 1911. (*Ed.*).

trustworthiness, could be called for. Such regulations should casily lead to the suppression of the secondary restrictions now in force; and would make it possible for frozen meat to be admitted into all countries as sound food of good quality.

For this purpose the Governments of the several countries should submit their regulations and a specimen of the certificates they would require to the Paris conference. Once these regulations and conditions agreed upon,the Governments of theexporting countries would have to guarantee that all meat exported would at all times comply with the conditions required; and be accompanied by certificates showing that the animals had been slaughtered under sanitary conditions and that on inspection by duly authorised veterinarians both before and after slaughter, te animals were found free from all disease.

The Frozen Meat Trade in 1910. (Le Commerce de la Viande conservée par le Froid en 1910). — *Bulletin mensuel de l'Associaciation Internationale du Froid*, Nos, 15, 16, 17, pp. 155-160. Paris, Avril, Mai, Juin, 1911. 2222

The year 1910 has been most successful for the frozen meat trade in the United Kingdom.

United Kingdom. Austria. Italy. Australia : N. Zealand, etc.

The imports of frozen and chilled meat attained the unprecedented figure of 610 970 tons. In spite of the enormous increase in the imports, the average price was much higher than in 1909.

1910 has been characterised by a rapid change of opinion in almost all European countries in favor of granting greater facilities for the importation of frozen meat, to make up for the scarcity and high price of food.

Austria and Italy have made considerable progress in this direction ; Switzerland is preparing to follow their example, and Portugal has just abolished the import duty on meat. Germany has not yet made up its mind, but a tendency is evident to curtail the restrictions which hinder the importation of frozen meat.

In France home production and that of the French colonies in North Africa has hitherto been sufficient to meet the demands of a stationary population.

The total production of the 55 refrigerating establishments of Australasia and of the 11 of South America is estimated approximately, for 1910, at 602 699 tons; of which 586 630 were shipped to the United Kingdom, and 16 069 tons to other markets.

Two new refrigerating factories have been built in New Zea-

land, two in Australia and one in Venezuela. A third factory is now being planned in Patagonia.

There are 214 steamers now fitted with cold-storage, that can ship a cargo of 14 225 500 frozen sheep, weighing 56 lbs. each. Other 25 steamers will be in service in 1911.

The tonnage of the cold-storage steamers has often been found inadequate in 1910. The growth of the world's cold-storage fleet does not seem to correspond to the growth of the trade in frozen meat.

Transport facilities are particularly lacking in the Mediterranean.

The information here given is obtained from the annual review of the frozen meat trade, published by Messers W. Weddel and C°, Ltd. London (1).

2223 **Export of Frozen Meat from New Zealand** (Der Export von Gefrierfleisch aus Neuseeland). (Rapp. du Cons. d'Autriche-Hongrie, à Aukland). — *Das Handelsmuseum* Bd. 26, No. 23, p. 438. Wien, 13 Juli, 1911.

Although the export of frozen meat from New Zealand is growing noticeably, its position ont he London market is not of the best, partly because it is not suitably unloaded.

N. Zealand

Next year the price of New Zealand meat will rise, as more oxen and sheep have been slaughtered during the dry season than has been the case in other years (2).

2224 **Wool and Meat of New Zealand.** — *Live Stock Journal*, No. 1946, p. 65. London, July 21st, 1911.

The Dominion of New Zealand is a very important contributor of both wool and meat. The productive capabilities of the country

N. Zealand

may be gauged by the following considerations; in the year 1882, when the export of frozen meat began, the sheep flock numbered about 13 millions; during the period 1882-1911 a total which is moderately estimated at 130 million sheep and lambs was disposed of by export (frozen and preserved), local consumption, and boiling down; and last year the New Zealand flock stood at 24 ½ millions.

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(1) Compare with W. Y. Sulis. *Consumption of Cold-Storage Provisions in the United Kingdom.* U. S. Monthly Consular and Trade Reports, No. 443, April, 1909; abstracted in *The Science and Practice of Farming during* 1910 *in Great Britain*, p. 625. Intern. Inst. of Agric. Rome, 1910.

(2) In 1909, the frozen meat exported from New Zealand was valued at £3 601 093. The wool clip, in 1909, in New Zealand, was 194 886 524 lbs, of which 189 683 703 lbs were exported. *The Statesman's Yearbook for* 1911 p. 337. (*Ed.*)

Further, last year's export of 5 ½ million mutton and lamb carcases, with over two million carcases used for human consumption and other purposes in the dominion, and the number boiled down, say, a total of nine million sheep and lambs, was provided by a ewe stock numbering little more than 12 millions.

This year although the conditions are less favourable than last year, the export is expected to show an increase, while the standing flock will be further augmented.

Algerian Wool. (Les Laines d'Algérie). — *Supplément au N.* 14 *du Bulletin de l'Offiee du Gouvernement Général de l'Algérie.* Année 1911, pp. 207-247. Paris, 1911. 2225

The wool production of Algeria has been constantly growing from 1901 up to 1909, reaching its highest point in 1907 and 1908, with an output of some 210 000 quintals (21 000 tons) each season. In 1909 it suddenly declined, falling to an approximate figure of 100 000 quintals (10 000 tons). Algeria

Production for 1901 to 1909 :

1901	metric quintals	96 802	Brit. tons	9 527
1902	»	127 296	»	12 528
1903	»	136 004	»	13 385
1904	»	149 920	»	14 755
1905	»	144 400	»	14 212
1906	»	168 050	»	16 540
1907	»	210 184	»	20 686
1908	»	208 404	»	20 511
1909	»	99 745	»	9 817

The following table gives the annual averages for the export of uncarded wool from Algeria :

1870-1879	metric quintals	68 702	Brit. tons	6 761
1880-1889	»	53 828	»	5 297
1890-1899	»	63 922	»	6 191
1900-1910	»	85 644	»	8 428

Algerian wool is commercially classified in three brands :

1, Superfine, wavy wool, fine and soft, like that of merino sheep.

2, Fine wool, in which most of the staples belong to the first category, but mixed with some coarser hair-like fibre.

3. Coarse wool, the staple of which is harsh, like horsehair, or which contains thistles.

The following measures are advised for improving Algerian wool :

It should be washed on the sheep's back before shearing; it should never be sheared with a sickle (*faucille*); weighing machines should be installed in the markets; all adulterated wool should be seized and burnt ; it should be carefully sorted ; and shelters should be erected where the sheep can take refuge during bad weather.

2226 H. ATWOOD. **Construction of a Modern Poultry House and Report Experiments in Hopper Feeding of Laying Hens.** — *West Virginia University: Agricultural Experiment Station, Morgantown, W. Va. Bull.* 130, pp. 197-203. 1910.

A year's test with five pens of White Leghorn fowls.

United States: Virginia

The egg production varied from 81.4 eggs, in the case of the pen fed principally upon corn, to 124.7 in the case of the pen which received whole grain once a day, scattered in litter, and dry mash and beef scrap ad libitum in a hopper. Two pens, hopper fed, produced eggs having a lower food cost than the pen which received moistened mash; and in this test there was apparently no benefit from the extra labor involved in moistening the mash.

2227 J. L. FRATEUR. **The Duration of Fecundity in Hens separated from the Cock.** (La durée de la Fécondité des Poules séparées du Coq.). — *Laiterie et Elevage.* 6e An., No. 13, pp. 97-99. Louvain, 1 Juillet, 1911.

Belgium

Some time ago the writer set 15 eggs laid by hens whose cock had died 15 days before the eggs were laid; and by the end of the 21st day 3 chicks were hatched. Three series of experiments were made by Mr. Frateur with a view to determining how long fecundity lasts in hens after they are separated from the cock. The 1st series was made with « Coucous de Malines », one cock and six hens; 2nd series « Concous de Malines » one cock and four hens; 3rd series, White Orpington hens; aud Minorca cock: one cock and four hens.

Each series of experiments was made over a period of four weeks ; the eggs were incubated artificially. The hens continued to lay fertilised eggs for 14 days after separation from the cock, in the case of the 1st and 2nd series; and for 15 days, in the case of the 3rd series.

J. L. Frateur. **When do Unfertilized Hens, returned to the Cock, lay Fertilized Eggs?** (A partir de quel moment des poules non fécondées, rendues au coq, pondent elles des oeufs féconds?).— *Laiterie et Elevage.* 6e An., No. 14, pp. 105-108. Louvain, Juillet, 1911. 2228

Belgium

The writer made two series of experiments at the stock-breeding Institute of Louvain, on five sets of hens. The first series was made at the end of March on two sets of hens; the first consisting of four White Orpington hens and a Minorca cock; the second set consisting of 5 hens and a cock of the « Coucou de Malines breed. In both sets fertilised eggs were laid after the second day.

The second series of experiments, made during the second half of May, dealt with three sets of hens. The first set of this second series consisted of eight White Orpington hens and a Minorca cock; the second set of four White Orpington hens and a Minorca cock; the third set of 6 « Coucou de Malines » hens and a cock of the same breed. The first set laid fertilised eggs after the fourth day; the second set from the second day; and the third set from the third day.

To summarise the results, fertilized eggs were laid in three sets on the second day and in two others on the third and fourth day.

Some Experiments in Fertilization and Incubation of Hens' Eggs. — *Geflügel-Welt,* 3 J., No. 27, p. 207. Chemnitz, 4 April 1911. 2229

Germany

Fertilization. — The writer has experimented with an Italian cock and Italian and Wyandotte hens. In the former case he found that eggs laid 12 days after copulation were no longer fertilized; in the latter case they were infertile after 6 days.

Incubation. — The fresher the eggs, the more reliable are the results of incubation. In the writer's experiments, the chicks hatched out readily when the eggs placed in the incubator were not more than 3 weeks old. In the case of staler eggs, some of the chicks had not the strength to break the shell and died inside it. The mortality rose proportionately to the age of the eggs.

Nevertheless, breed also has an influence on the duration of the vitality of the germ, which is of longer duration in the hardier breeds. The season at which the eggs are laid also makes a difference.

Eggs once heated in the incubator take a long time to cool. The heating of three incubators, each containing 200 eggs, was in-

terrupted for 24 hours, leaving them at the temperature of the room in which they were placed, without causing injury to the chicks; 72 %, 80 % and 82 % respectively hatched out.

2230 MARIO GUARDASONI. **Italian Breeds of Poultry: "Leghorn" (Livorno) and "Valdarno".** (Le razze italiane di polli). — *L'industria lattiera e zootecnica.* An. IX, N. 13, pp. 203-204. Reggio Emilia, 18 Luglio 1911.

The writer comes to the following conclusions, as the result of a comparative study of the qualities of the Livorno, or "Leghorn" breed of poultry, which he considers to be the true Italian breed, and the breed known as "Valdarno".

Italy: Tuscany

The "Leghorn" and "Valdarno" fowls are so much alike in appearance, that many writers speak of the "Valdarno" as a variety of the "Leghorn". Nevertheless there is always a distinct difference in the leg-colour, which is dark and often black in the "Valdarno" hen, and always bright yellow in the "Leghorn". They also differ notably in points of precocity, prolificacy, sitting capacity, fattening qualities, and especially in the quality of their meat.

The "Valdarno" hen cannot rival the "Leghorn" as a layer and in the quality of the eggs; but, on the other hand, it grows more rapidly and its meat is more delicate.

These considerations are of all the more importance as "Valdarno" poultry are hardy and suited to the most varied climates.

2231 J. E. DUERDEN. **The Future of the Ostrich Industry in the Union of South Africa.** — *Agricultural Journal of the Union of South Africa.* Vol. 1, No. 3. Pretoria, April 1911.

In a paper read at the meeting of the Ostrich Farmer's Association at Middelburg, on March 6th 1911, the writer summarized as follows:

Union of S. Africa

1. It is now established from the past history of the ostrich industry and its present condition that ostrich farming is to be regarded as a permanent branch of farming; and that a still increasing demand for ostrich plumes may be expected in the future.

2. Looking to the future, only the possibilities of overproduction and competition with other countries on an unfair basis are to be feared.

3. As regards over-production there seem to be factors at work which may have a regulating influence. Should over-production however reach Sout Africa, it is satisfactory to reflect that it

will bring no general disaster as it did in the eighties; but will simply mean the directing of South Africane nergies into other channels, until supply and demand have had time to regulate themselves.

4. Anything like a monopoly of the ostrich industry and the present benefits from prohibition can only be temporary. One must be prepared to meet competition; and on a fair basis South Africa and the South African farmer will more than hold their own.

Last year the exports of feathers from South Africa amounted to 741 078 lb., with a total value of £ 2 272 846; and an average value of of £3 1*s.* 4*d.* per lb. (1).

MÉNÉGAUX and CONTENT. **The Utilisation of Birds' Feathers in France.** (Utilisation des plumes d'oiseaux en France). — *L'Agriculture Commerciale*, VIII. An., N. 12, p. 296. Paris, 25 Juin 1911. 2282

Wild and foreign birds only contribute 2 % of the feathers used in millinery. As useful wild birds are protected in Europe, no trade is done in their feathers. Almost all the plumage of wild birds, such as Marabout, Birds of Paradise, and Ospreys, is imitated with the feathers of farm-yard birds. French and foreign agriculture has found in this trade a means of utilising a bye-product formerly unsaleable, and derives therefrom tens of millions of francs. France

Here are some figures for the annual trade done in feathers in France through the agency of the whole-sale poulterers:

	Kgs.	Brit. Tons	Francs	£
Geese	470 000	462.5	4 700 000	186 000
Turkeys	344 000	338.5	860 000	34 100
Ducks	140 000	137.8	560 000	22 200
Pigeons	70 000	68.9	280 000	11 100
Cocks, hens	3 060 000	3 019.1	2 870 000	113 700

(1) The following is the value of the ostrich feathers exported from Cape Colony during recent years:

Year	Value in £. sterling	Equiv. in frcs.
1905	1 081 187	27 299 971.75
1906	1 406 119	35 504 504.75
1907	1 814 210	27 305 877.25
1908	1 738 389	43 894 322.25
1909	2 091 207	53 802 976.75

The Statesman's Yearbook for 1911, p, 206. (*Ed.*).

2233 **The Breeding of Oak Silk-worms in France** (L'élevage du Ver à soie du Chéne en France). — *Le Moniteur des Soies*, 49e An., N. 2543, p. 5. Lyon, 24 Juin, 1911.

France

The Minister of Agriculture has granted a first subsidy to the Silk-growing Station of Montpellier, to allow of its pursuing its studies on the acclimatisation and breeding in France of wild silk-worms (*Bombyx Pernyi* and " Jama-Mai "), which feed on oak leaves.

To realize the extent to which Tasar silk (1) is used in France it should be noted that in six days, 12 000 kgs of this silk were sold in France.

2234 **The Progress of Sericulture and Silk-spinning in Hungary**. (Les progrès de la sériculture et de la filature de la soie en Hongrie). — *Bulletin des Soies et des soieries*, An. 35, No. 1785, pp. 3-4. Lyon, 22 Juillet 1911.

Hungary

Sericulture is a farm industry which has developed considerably in Hungary in the last 30 years. In 1879, only 2507 kgs. (5525 lb.) of silk cocoons were produced. In 1910, 1 644 972 kgs. (3 625 518 lb.) of cocoons were delivered by 90 000 families (2).

The production of cocoons in Hungary amounted to

1880	10 141 kgs.	equal to	22 350 lb.
1885	176 337 »		388 647 »
1890	1 043 096 »		2 298 984 »
1895	1 499 845 »		3 305 659 »
1900	1 354 118 »		2 984 476 »
1905	1 959 213 »		4 318 105 »
1910	1 644 972 »		3 625 518 »

The silk-mill at Törökkanisza spins each year 100 000 kgs. (220 400 lb.) of cocoons; and has an output of 6 500 kgs. (14 335 lb.) of raw silk. The Bébéscsaba silk-mill spins 205 000 kgs. (451 820 lb.) of cocoons, with an output of 17 000 kgs. (37 468 lb.). The nine silk-mills of Hungary spin a total of 1 550 000 kgs. (346 200 lb.) of cocoons, with an output of 130 000 kgs. (286 520 lb.) of raw silk.

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(1) Tasar is a generic name for all silk-spinning insects except *Bombyx Mori*. (*Ed*).

(2) In 1909, 95 116 families in Hungary were engaged in sericulture, as against 1 059 in 1879. The yield of the cocoons was 2 013 metric tons (1980.8 English tons) valued at £172 960 (4 367 240 fr.). *The Statesman's Yearbook for* 1911, p. 620. (*Ed.*).

At Szeksard there is an Inspection Station fitted with 267 microscopes, where an average of from 7 to 8 million samples are examined yearly.

The breeding of silk-worms is taught throughout Hungary by means of leaflets, freely distributed, and by lectures illustrated with lantern slides. In communes where it is desirable to introduce the silk-breeding industry the school-mistresses are specially trained to give instruction in this art.

Special importance is attached to the cultivation of the mulberry in Hungary, as the Government wishes to be able to supply breeders with the leaves they require for their silk worms. Government inspectors are appointed to watch over the development of mulberry plantations. The result of their efforts is seen by the following table which gives the number of mulberry trees planted in Hungary.

1880	1 024
1885	79 862
1890	190 079
1895	148 350
1900	383 777
1905	340 554
1910	636 329

A. P. CHOUDHURI. **"Eri" Silk in Behar.** — *Dept. of Agr. Bengal.: Quarterly Journal*, Vol. IV.. No. 3. Calcutta, January, 1911. **2235**

Eri silk is rapidly increasing in popularity in the province, owing to the fact that it can be used for making good, plain, lasting clothes. This silk can be easily prepared at home by the women of every family. The expenses of rearing the Eri silkworm (*Attacus ricini*) are small, so that the work can be undertaken by the poorer classes. It should make a good cottage industry if introduced into Behar, where the conditions are particularly favourable. **British India**

The only difficulty at present is the disposal of the raw products. Ordinary cocoons can sell at Rs. 60 per maund in Calcutta (10 ½ d per lb.).

In rearing the Eri silk-worms the following precautions should be taken. Castor leaves should not be dusty, wet, dry or decomposed. In very hot weather the eggs and the worms should be covered by a wet cloth, or the floor of the rearing-house should be sprinkled with water to keep it moist. In cold weather the eggs and worms should be kept for an hour or two in the sun, with a wet cloth

placed over the tray. Never expose the worms uncovered to the sun. The worms should be protected from the attack of insects etc. An account of the method to be adopted in rearing the Eri silk-worm is given.

2236 **The Sericultural Season in the Caucasus**. (La Campagne Séricole au Caucase). — *Le Moniteur des Soies*, 49e An., No. 2544, p. 4. Lyon, 1 Juillet 1911.

Official statistics show that from September 1910, to April 1911, 793 000 boxes of silk-worm eggs were imported into the Caucasus; or 23 000 boxes more than last year. Of these, from 740 000 to 750 000 boxes were from Turkish firms and contained eggs of the white Bagdad breed, and from 35 to 45 thousand boxes contained the eggs of European breeds from France and Italy. To these must be added the eggs produced by the Caucasian silk-breeders, amounting in all to from 25 000 to 30 000 boxes.

Russian Empire: Caucasus

Of these 270 000 boxes were reexported to Persia, and over 200 000 to Turkestan and China, thus leaving some 350 to 360 thousand boxes for the Caucasus, or 10 000 boxes more than last year.

Only 15 to 17 % of the total amount of eggs which remained in the Caucasus, *i.e.*, 60 000 boxes, were examined by the Sericultural station of the Caucasus.

2237 **The Production of Silk in Syria**. (Syrische Seidenproduktion). *German Consular Report*. — *Das Handelsmuseum*, Bd. 26, Nr. 23, p. 360. Wien, 8 Juni, 1911.

The silk output of Syria, in 1910; was 20 % higher than in 1909. In 1910, 5 925 000 kgs. (5840 tons) of cocoons were obtained, as against 4 850 000 (4782.4 tons) in 1909, representing a production of 515 000 kgs. (506.8 tons) of raw silk, in 1910; as against 420 000 kgs. (413.3 tons) in 1909.

Ottoman Empire: Syria

Silk-worm breeding is developing; 65 % of the cocoons were spun in the country, the remainder in France and Italy. Nevertheless the silk-spinning industry is declining, because of emigration. The tendency is more and more in favour of producing cocoons for exportation. They fetch from 3.10 to 3.50 frs. per kg. (1*s* 1*d* to 1*s* 3*d* per lb).

he World's Production of Raw Silk. — *Journal of the Royal Society of Arts*, No. 3060, p. 867, London. July 14, 1911. 2238

The Union des Marchands de Soie of Lyons have published the llowing statistics, respecting the production of raw silk throughout e world during 1910, as compared with that of the previous year·

European Countries:

	1909	1910
	Kilog. (1)	
France	674 000	320 000
Italy	4 251 000	3 947 000
Spain	82 000	83 000
Austria-Hungary	378 000	355 000
	5 385 000	4 705 000

Levant aud Central Asia:

Anatolia	665 000	510 000
Syria and Cyprus	445 000	515 000
Other Provinces	125 000	100 000
Salonica-Adrianople	380 000	285 000
Bulgaria-Servia-Rumania	223 000	170 000
Greece and Crete	60 000	55 000
Caucasus	540 000	520 009
Persia and Turkestan	600 000	540 000
	3 038 000	2 695 000

General Summary:

European Countries	5 385 000	4 705 000
Levant and Central Asia	3 038 000	2 695 000
Eastern Countries	16 087 000	16 950 000
	24 510 000	24 350 000

These figures show a considerable falling off in the production f silk in Europe during 1910, as compared with that of the preious year. The East, particularly Japan, holds her own, and even nows a notable increase last year over the production of 1909.

(1) 1000 kilograms = 0.984 ton (English) (*Ed.*).

2239 LEAY (Brit. Cons. at Boston). **Bee Keeping in Massachusetts** — *Diplomatic and Consular Reports*, No. 4694, pp. 7-8 London, June, 1911.

United States: Massachussets

The Massachusetts State Inspector of Apiaries, whose office was created by the Massachusetts Legislature of 1910, has made some interesting statements about the utility of bees.

Instead of being a minor industry, bee-keeping is fundamental to agricultural interests and occupations, involving millions of pounds.

In the apple orchard, fruit garden and vegetable garden, the presence of a healthy colony of bees is of the greatest importance for the success of the crop. It is on record that a Massachusetts grower of melons, in a region badly infected with bee diseases — a large percentage of the bees having been killed off — had an extraordinary yield as the result of hiring, as an experiment, a single healthy colony of bees.

Bee culture is an uncertain industry in Massachusetts at present, on account of the ravages of two diseases, the American foul brood and the European foul brood. State inspection has been authorised to eradicate these diseases and the inspector is now at work on this task.

2240 **Fish-culture in Germany**. (La piscicoltura in Germania). — *Bollettino del Ministero di Agricoltura, Industria e Commercio*, Serie B., Fasc. 2, pp. 42-43, Roma, 15 Luglio, 1911.

Germany

The breeding of fish in ponds has developed greatly in Germany. The provinces where most is done in this direction are Silesia, Brandenburg, Schleswig, Westphalia, Hanover, Lorraine, and the States of Bavaria, Saxony, Württemberg and Baden. The area devoted to pisciculture in the German Empire amounts to 75 000 ha. (186 000 ac.). Carp and trout are the favourite fish with breeders.

Carp require tepid water, and large ponds, where the water is not too deep and where there is a slight current. These conditions are likewise suited to the breeding of pike, trout, perch, tench, and eels. Carp ponds can be dried in the winter and used for cultivation, or left fallow.

A pond which is run dry and cultivated after manuring with me, superphosphates, etc., is more productive of fish when next sed for that purpose. (1)

(1) The following figures give an idea of the importance of the German ade in fish and other products of fresh water.

IMPORTS	1909		1910	
	Quintals	Marks	Quintals	Marks
arp.	14 238	1 541 000	14 324	1 547 000
ther live fresh-water fish . .	21 492	3 110 000	23 280	3 376 000
ther dead fresh-water fish. .	52 977	7 237 000	62 263	8 530 000
rayfish	9 757	1 903 000	9 923	1 935 000
Total imports . . .	98 464	13 791 000	109 790	15 388 000

EXPORTS	1909		1910	
	Quintals	Marks	Quintals	Marks
arp.	1 257	141 000	901	108 000
ther live fresh-water fish . .	1 771	313 000	1 433	241 000
ther dead fresh-water fish. .	22 485	1 763 000	22 303	1 727 000
Iolluscs, frogs' legs	2 522	218 000	2 709	228 000
rayfish	2 825	763 000	3 109	865 000
Total exports . . .	30 860	3 198 000	30 455	3 169 000

1 quintal = 1.968 cwt., 1000 quintals = 984 tons; 1 mark = 11 3/4 *d*, 1 million marks = about £ 489 476.

RICH. CALWER — *Jahrbuch der Weltwirtschaft* 1911, p. 29 Jena, 1911. (*Ed.*)

2241 STEPAN. **Carp Breeding in Ponds in Bohemia.** (Erster Bericht über die im Jahre 1910 in Gemeindeteichen und in Teichen kleiner Landwirte gemachten Karpfenzuchtversuche). — *Oesterreichische Fischerei Zeitung*, VIII. J., Nr. 15, pp. 247-249. Wien, 1. August, 1911.

Experiments in fish-culture were begun in Bohemia, in 1910, in the village ponds and in ponds belonging to small farmers. Carp were the principal fish. The results obtained were excellent. The breeders had to conform to the following conditions:

Austria: Bohemia

The only experiments recognized were those made in small private or village ponds between 60 rods and 1 ¼ acre in extent.

The fish were not to be fed artificially, the whole year round. The provincial authorities had a right to make inspections. These authorities had to be given 15 days notice of the trial fishing. The Provincial Council provided young fish, free of charge. The experiments will be continued. In the case of one trial, made with 120 carp, weighing 32 kgs. (70 lbs.), which were turned into a pond 14 ares (56 rods) in extent, 116 carp were fished, weighing 92.8 kgs. (204 lbs.); this is an increase of 60.8 kgs. (133 lbs.), or 434 kg. per hectare (387 lbs. per acre).

Agricultural Industries.

V. MATHIEU. **Colouring White Wines.** (La Coloration des Vins Blancs). — *Bulletin Agricole de l'Algérie et de la Tunisie*, 17e An., No. 8, pp. 203-204. Alger Mustapha, 15 Avril 1911.

2242

The more or less deep colour of wines and brandies is partly due to ageing, *i.e.* to quality; but to satisfy the taste of the consumer, producers sometimes emphasise the yellowish tint of their wines and brandies. There are even some parts of France where the market demands that white wines be of a distinctly yellow shade of colour.

Algeria

Burnt sugar has long been used to impart to cheap wines this yellowish tint; it is quite harmless and is recognized as a colouring matter for drinks and food-stuffs by scientific authorities and by the law. But French law strictly prohibits the artificial colouring

of wines, and no exception is made to this rule in the case of burnt sugar.

The colouring of brandy, cider, and rum with burnt sugar, in accordance with custom, is not illegal.

J. LEWIS. **An Investigation into the Fermentation of Grape Must.** — *Agricultural Journal of the Union of South Africa*, vol. 1, No. 3. Pretoria, April, 1911,

2243

This investigation had for its object the study of the course of fermentation in the ordinary practice of making wine, with particular reference to the relative rates of formation of alcohol and glycerine, of dextrose aud levulose and the ratio between the sugar destroyed and the alcohol formed. In order to arrive at more definite conclusions on these points by the elimination of certain variable factors, a further series of researches was made on the vinous fermentation of sterile must by a selected yeast.

Union of S. Africa

The writer has found that for the practical fermentations the quantity of alcohol formed per 100 of sugar fermented lies between 44.6 and 46.7, with an average of 45.7; the quantity is somewhat less in the earlier stages, somewhat greater in the later stages of the fermentation. The figures average one unit higher in the case of laboratory fermentations.

The average rates of fermentation of dextrose and levulose are as 100 to 82, for practical fermentations; and as 100 to 93 for laboratory fermentations. In the latter the difference in the rate is somewhat less at 30° C than at 25° C. The presence of alcohol does not affect the relative rates of fermentation of the two sugars.

Relative to alcohol, much glycerine is produced in the early stage of fermentation; very little towards the end. The maximum quantity per 100 of alcohol was 25.5, the minimum 2.4 (1).

In the laboratory fermentations, more glycerine was produced at 30° C then at 25° C.

The presence of alcohol lessens the production of glycerine.

The formation of glycerine, dees not seem directly connected with the splitting of the sugar and formation of alcohol; nor is glycerine a pathological product of the yeast. Possibly it is connected with the propagation of new cells.

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(1) The careful experiments of Buchner and Meisenheimer, in 1906, have shown that the quantity of glycerine formed in alcoholic fermentation corresponds to 3.8 % of the sugar decomposed. ARTHUR HARDEN, *Alcoholic Fermentation*. London, 1911, p. 83. (*Ed.*).

2244 E. KAYSER. **Influence of Physical and Chemical Agents on Wine Ferments.** — (Influence des Agents Physiques et Chimiques sur les Levures de Vin). *Revue de viticulture*, 18e An., No. 919, pp. 89-96. Paris, 27 Juillet 1911.

PHYSICAL AGENTS: *Heat.* — The best temperature for wine ferments varies between 20°C and 30°C according to the region under consideration. In Central France wine is fermented between 15°C and 20°C.; in the South and in Algeria at from 30°C to 32°C., and even at 36°C.

France

The following example shows the influence of temperature on different brands. It refers to the fermentation of sweetened must, containing 180.8 gms. of sugar and 6 gms. of tartaric acid per litre.

Percentage ratio of sugar decomposed.

Ferment	Origin	At 25°C.	At 30°C.
No. 1	Champagne	98.0	22.2
» 2	Champagne	98.4	36.3
» 7	St-Emilion	97.5	61.5
» 8	Clos-Vougeot	98.2	58.8
» 32	South	98.3	79.7
» 10	Algeria	98.1	70.4

The degree of heat which is destructive to the ferments varies with the brand, age, and origin of the ferment, with the presence or absence of water, the vegetative or sporular condition, the reaction of the environment in which the heating takes place. This temperature varies from 45°C to 60°C. in damp surroundings; and in the spore-stage resistance increases by 5 %. When dry, some ferments can stand heating for 5 minutes in a current of air raised to 110°C. On the other hand, the acid reaction of the medium (grape must) increases the action of heat.

In considering the effects of low temperatures on latent life, it has been observed that very intense cold (as low as — 252°C.) prolonged for 5 or 6 months, in no wise affected the vitality of yeast, only causing a slight delay in starting the fermentation for which the yent was used later on.

Light, in the presence of oxygen, ends by causing death. According to experiments by M. Martinand, 4 hours in the sun-light at a temperature of 40°C to 45°C., or 72 hours at 36°C prove fatal to yeast.

The vitality of yeast is very persistent. Wertmann and Kayser found living yeasts in wines 30 years old. If well dried, yeast kept

in a dark, cool place, preserves its vitality for 7 years; and in damp places for 12 years.

CHEMICAL AGENTS: *Oxygen.* — All yeasts require some amount of oxygen to multiply (this is the reason for mixing the must after pressing the grapes, *foulage*); then the yeasts can adapt themselves to anaerobic life and proceed to decompose sugar. But yeast is much more active in the presence of oxygen, as is shown by the experiments made by Hansen at Copenhagen, with beer-yeast, with the following results.

Number of cells.

	Liquid not aerated	Liquid aerated	Difference in favor of aerated liquid
1st day	55	55	—
2nd »	279	800	521
3rd »	405	1498	1093

Aeration is valuable at the start, when the sugar content is high; but it should not be excessive, or the temperature will rise too high, and the enzymic secretion of the yeast will decline.

Sugars. — Wine ferments behave in a similar fashion to the several kinds of sugars; the rapidity of their action varies, and they can stand saccharine concentrations of 11, 15, 20, 26 % and more.

Most yeasts prefer glucose; though some attack levulose by preference (Gayon and Dubourg). This indicates a mode of differentiation in these organisms.

Carbohydrates etc. — Many carbohydrates act as food for yeasts; also acids in the state of acetates, lactates, malates, and tartrates, glucosides, amides, etc.; but in these cases the intervention of air is essential, and the age of the yeast is also a matter of importance.

Nitrogen. — Pasteur, Duclaux, Mayer and Laborde have ascertained that grape-must always contains an appreciable quantity of ammoniacal nitrogen. Yeast also absorbs organic nitrogen; but it excretes as much as it absorbs. Good nitrogenous foods are ammoniacal salts, phosphate of ammonia, asparagin, and peptone.

Mineral matter. — Yeast requires phosphorus, sulphur, potassium, magnesium and calcium. The excessive saline content of artificial mediums rather tends to reduce the yield in alcohol.

Acids. — Many yeasts can stand as much as 1.5 % or even 3 % of tartaric acid. Malic, citric, succinic, and lactic acids are supported even better; 1 % of acetic acid (the constant product of fermentation) causes no disturbance. Formic acid is tolerated in the proportion of 0.1 to 0.3 per litre.

Sulphuric acid, in quantities not exceeding 2 ‰, favours the yeast; a higher proportion weakens it. Phosphoric acid, in quantities not exceeding 1.3‰, is useful. Carbonic acid, a product of fermentation, seems to exercise a certain influence on fermentation; if it is partially removed, and if the pressure is thus reduced, a more thorough decomposition of the sugar is obtained, and the weight of the yeast increases.

Alcohols. — Mr. Regnard has found that nitrogenated must, containing 2 gms. of grape-sugar in 250 cc., ceased to ferment in the presence of

2 %	methyl	alcohol
15 %	ethyl	»
10 %	propyl	»
2.5 %	butyl	»
1 %	amyl	»
0.2 %	caproic	»
1 %	caprylic	»

Salts. — Some favour fermentation (phosphates, nitrates and sulphates of potassium and ammonium); some are indifferent (potassium acetate); others delay it (potassium iodide).

There are some compounds which in moderate quantities act as stimulants, but which in larger quantities become poisons (1). The quantity which is poisonous is not constant; but varies with external conditions, and with the degree in which the yeast is inured to such compounds. By gradually increasing the dose, yeast can be made to stand greater and greater quantities of antiseptics. (Effront, Experiments with ammonium fluoride).

Kayser and Marchand have observed that yeast accustomed to doses of from 1 to 2 ‰ of a manganese salt (sulphate, nitrate, phosphate), produces rapid and thorough fermentation; and this faculty seems to be hereditary for some time. Moreover, by this treatment, yeasts can be trained to bring about the rapid decomposition of levulose, the chief food of ferments causing disease.

Gimmel has noted the same thing in the case of bismuth subnitrate and stannous chloride.

Tannin. — Mr. Rosenthiel has found that enzymic activity is greatly reduced in grape-must rich in tannin. Apiculated yeast seems most sensitive to the action of tannin.

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(1) See Abstract 1377. *Bull.* May 1911.

Sulphur Dioxide. — Fermentation is delayed from 30 to 36 hours, sometimes even as much as 10 days or more, in the case of wine which has been treated with much sulphur dioxide. Linossier has noted that 1.25 gm. of sulphur dioxide per litre kills yeast in 15 minutes; but that it can live for several days in a solution containing 0.054 gm. per litre. Seifert has noted that free sulphurous acid is much more poisonous than that combined with aldehyde.

Copper sulphate. — Fermentation is slow to start in sulphated must; but when once started, it proceeds more actively than under normal conditions, varying with the kind of yeast used. Dilutions of 1/4000 to 1/600 000 of copper sulphate are somewhat stimulating. Grape-must contains such slight traces of copper that its influence is of no importance.

Other Substances.

Furfurol. — A 1 % dose is always fatal. It is possible to accustom the yeast to this substance.

Chloroform. — 1 % does not interfere with fermentation.

Mercuric chloride and Salicylic Acid. — When present in the quantity of 1/500 000 they act as stimulants.

Boric acid. — 0.7 % delays fermentations, 1 % stops it.

A. Rosenstiel. **The Use of Selected Yeasts in Wine-Making.** (De l'emploi des Levures Sélectionnées en vinification). — *Revue de Viticulture*, 18e An., No. 919, pp. 99-105. Paris, 27 Juillet 1911. **2245**

Selected yeasts should only be used in musts sterilised by heat and protected from the air, by means of a layer of carbon dioxide But a relative degree of sterilisation is sufficient to allow of their showing their superiority in comparison to the wild yeasts of the grape. **France**

Strengthening the yeasts. — Wine containing 10 % of alcohol has too high a sugar content to start the action of ferments; wines containing from 6 to 8 % are better suited for this purpose.

There are three phases in the strengthening of ferments.

1) Boil in a flask a little grape-juice suitably diluted; plug the neck of the flask with cotton-wool and cover with paper to prevent dust penetrating. After cooling, add to it commercial yeasts, (2 %) and wait for fermentation to start.

Multiplication should only be undertaken on the third day.

2 Some diluted grape-juice is sterilised in stoppered bottles, heated for 2 hours at 90° in a water-bath. The second sowing is made in these bottles, by introducing into each 10 cc. of the 3 day-old ferments.

3) Some diluted must is sterilised in kegs of sheet-iron enamelled inside, of a capacity of 1 hectolitre.

The heating is done in a water-bath, so arranged that the keg can be turned on its axis. The rotatory movement greatly assists the change of temperature. The kegs are kept for two hours at a temperature of 65° C. After cooling, the contents of 4 bottles of must three days old (*i. e.* 2 litres of yeast) are poured into each keg. The bung of the keg is fitted with a cork, with a bent escape tube. The free end is plunged into a test tube containing some boiled water. This arrangement shows whether the gas has begun to be given off and whether the fermentation is rapid.

After three days' fermentation, the ferment is ready for sowing the large barrels.

The proportion of sugar and tannin has some influence on the activity of the ferments.

Bouquet-ferments ensure a good bouquet with grapes grown on low-lands, or not well exposed: the wine of these grapes if treated in the ordinary way, would have no bouquet, provided, however, that the vine-stock is of a kind from which wine with a good bouquet could be obtained, if the exposure and season were favourable In short, the ferment is *anthophorous:* that is to say, it acts on the *anthogenous* (1) matter which forms in wine, but which only develops its specific ferment in favourable years and situations.

M. Rosensthiel notes that the temperature most favourable to fermentation is from 13 to 20° C. At a higher temperature the volatile fragrant substances are carried off by the carbon dioxide gas and get lost in the air.

Selected alcoholic yeasts hould have malolactic ferments added to them.

2246 FERNAND REPITON. **Detection of Corrected Acidity in Wines.** (Recherches de l'acescence corrigée dans les vins). — *Moniteur Scientifique*, 55 An., T. 74, Liv. 834, p. 382. Paris, Juin 1911.

In detecting acescence, or acetic acid, in corrected wine, the writer suggests that the volatile acidity be measured by distillation France with steam under pressure. This operation should be repeated on another portion of the wine, introducing into the retort, through a funnel reaching to the bottom, a small quantity of syrupy phosphoric acid, and distilling as above. Should this further test indicate

(1) *Anthogenous* = bouquet-forming

a higher value, the mineral acids in the distillate are sought for, and, if necessary, measured.

After deducting these mineral acids from the value found, should the remaining value be equal to the volatile acidity previously determined, there has been no correction of acescence.

If the value should be greater, the wine examined contains combined acetic acid; that is to say that the wine affected with acescence, had been treated with an alkali or with neutral potassium tartrate.

I. ARTHAUD BERTHET. **Cane-Sugar Wine preparared with Grape-yeast.** 2247
(Sobre o fabrico de vinhodo caldo de cannas de assucar). — *Boletim de Agricultura*, 12 S., N. 2, pp. 123-127. Saô Paulo, Fevereiro 1911.

The State of Saô Paulo would derive great benefits by making wine from sugar-cane, as cane is the cheapest crop to grow there.

A drink known as « Garapa grossa » is already prepared from cane-sugar (1). There is no doubt that it would be as easy as it would be profitable to prepare real sugar-cane wine. Brazil: Sao Paulo

Several experiments were made in 1910 in fermenting the juice of the cane, with good results: always using grape ferments.

These experiments justify the conclusion that, though the preparation of sugar-cane wine has not yet been carried out on a large scale, it is already possible to produce rapidly an excellent white wine.

A. FERNBACH. **The Influence of Phosphoric Acid and its Compounds in Brewing**. (L'Acide Phosphorique et ses composés dans la fabrication de la Bière). — *Annales de la Brasserie et de la Distillerie*, 14e An. No. 10, pp. 217-221. Paris, 25 Mai, 1911. 2248

A more thorough and accurate knowledge of fermentation has shown that many important factors come into play besides the fermentable sugar, amongst which mineral substances must be mentioned: first of all and more especially phosphoric acid, which has a prominent role. France

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(1) « Garapa grossa », « garapa azeda », « garapô » is an alcoholic drink prepared in Colombia, Ecuador, and Brazil from sugar cane, undistilled, and sometimes flavored with lemon. C. HARTWICH, *Die Menschlichen Genussmittel* p. 651, Leipzig. (Ed.).

Phosphoric acid in beer is derived almost exclusively from the barley, in which it is present in a fairly constant ratio.

The most recent studies lead to the conclusion that phosphorus exists in plants in a state of complex organic combination, to which the name of phytine has been given. It is only during germination that this phytine is decomposed by a special diastase, phytase, and that the phosphoric acid assumes a mineral form.

The important part played by these phosphates is apparent during two important phases of brewing — saccharification and fermentation.

During saccharification, the neutral phosphates hinder the action of the amylase, whereas the acid phosphates are either favourable or indifferent. According to this theory, the richer a malt is in acid phosphates, the more it will tend to produce maltose in the mash-vat. These acid phosphates are a protection against the alkalis contained in the mashing water: they therefore regulate the diastasic activity.

Phosphates also play an important part, outside the mashing-vat, as an essential food of ferments.

But the phosphates of must are not only a food for the ferment. They also have a most interesting part in the action of zymase; inded they are essential to this process, and form part of the mechanism of fermentation itself. Combinations of phosphoric acid and organic bodies act as co-enzymes.

Phosphoric acid compounds also increase the volume of carbon dioxide given off by sugar subjected to the action of a ferment, and this in a ratio proportionate to the weight of phosphate added.

Lastly, the ferment on coming into contact with phosphoric acid, is noticeably stimulated, and enzymosis is more rapid.

These few facts show the important part played by compounds of phosphoric acid in brewing, a part which is almost as important as that of the fermentable sugar itself (1).

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(1) On the part played by phosphoric acid in alcoholic fermentation, see ARTHUR HARDEN, *Alcoholic Fermentation* (Monographs on Biochemistry edited by A. H. ADERS PLIMMER and F. G. HOPKINS) London, 1911. (*Ed.*).

The same considerations used for brewing may be applied to wine and to the conditions that favour the action of wine-yeasts. See, on the question of phosphorus in wines: A. FUNARO ed A. RASTELLI, *Sullo stato di combinazione organica del fosforo nei vini.* Ann. delle R. Accad. di Agricoltura di Torino, 1906; and MARCO SOAVE. *Sul fosforo organico nei vini.* Le Staz. sperim. agr. ital. vol. XXXIX, 1906, p. 438. See this *Bulletin* Abstr. 1862, June 1911.

J. CHAPELLE and J. RUBY. **Commercial Experiments in Oil-Making in France.** (Essais industriels d'Huilerie en France). — *Bull. mens.de l'Office des Renseign. Agricoles*, X^e An., No. 6, pp. 694-702. Paris, Juin 1911. **2249**

The branch of the French Ministry of Agriculture which deals with the oil industry, has undertaken two series of experiments to ascertain in what degree the yield of oil is increased by prolonging pressure, and by adding cold or hot water. These experiments were made in the co-operative oil-mills *la Travailleuse* at Cetignac (Var), and *la Grassoise* at Grasse (Alpes Maritimes). **France**

The results obtained led to the following conclusions:

Ripe olives, rich in fats, fluid, and well crushed, yield a high proportion of oil on the first pressure, even when the presses used are not powerful. By prolonging the pressure, the yield is increased but the quality may deteriorate.

The maximum yield is obtained by adding hot water to the second pressing, and by stirring the pulp. The supplementary yield thus obtained is not very high when the pulp has been thoroughly drained by the first pressure, and when the apparatus used for this second one is not very powerful; but under other conditions it is very considerable and more than repays the extra expenditure.

The writers note that in some mills the pulp is not only stirred by hand, but is again passed through the mill on coming out of the preparatory press, and hot water is added whilst it is being ground between the mill-stones. They did not try this method, which ought to give a high yield.

VUAFLART. **Niger Oil and Poppy Oil.** (Huile de Niger et huile d'Oeillette). — *Annales des Falsifications*, N.° 32, p. 330. Paris, Juin 1911. **2250**

Niger-oil (1) is now prepared in France in sufficient quantities to make it necessary to characterise it when pure, and to detect it when it is mixed with poppy-seed oil, or other oils. **France**

(1) Niger-oil is extracted from the seed of *Guizotia abyssinica* or *oleifera* syn. *Verbesina sativa;* it is also known by the name of " rum-till ". According to CH. BARON and Sir G. WATT niger-seed yields from 34 to 35.5 % of oil.

This plant belongs to the *Compositae;* it is widely cultivated in Abyssinia and Southern India, where it is known as " Kalatil ". On the Gold

Lewkowitsch gives the following data for these two oils:

	Niger	Poppy-seed
Density	0.925 — 0.927	0.925 — 0.927
Solidification point	— 9°	— 18°
Iodine index	126.6 — 133.8	132.6 — 157.5
Sulphuric acid heating	81° — 82°	86° — 88°.5
Butyrorefractometer at 40° C	63	63.4
» at 25° C	»	72 — 74.5

When tested by Blarez and Bellier's methods, a sample of niger oil gave the same reaction as pea-nut oil. The hexabromide test was negative, as in the case of poppy-seed oil. It is so similar to poppy-seed oil as to make it difficult to distinguish between the two, especially in the case of mixtures.

The only noticeable difference is in the solidification point; but the data on acidity should not be neglected, as in poppy-seed oils which have become stale and rich in free fatty acids, the solidification point rises considerably.

2251 FRANCIS MARRE. **Grape-Pip Oil** (1). (L'Huile de Pépins de Raisin). — *Revue générale de chimie pure et appliquée*, 13e An., T. XIV, No. 11, pp. 186-188. Paris, 4 Juin 1911.

The demand for oil for industrial purposes and the general tendency to utilise all bye-products, have led to the extraction of oil from grape-pips. In a report to the Chamber of Commerce of Nîmes, Mr.Claude Lorrain, after referring to the origin of this method **France. Italy** of utilising grape pips and to the revival of this industry in Italy, gives an accurate description of the technique employed. He states

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Coast it is called " rum-till ". *Guizotia* requires soil of an average composition.

See V. VERMOREL, *Aide Mémoire de l'Ing. agricole*, p. 540, Montpellier, 1906; VILLON-GUICHARD, *Dictionnaire de Chimie industrielle*, vol. III, word " *Huile* "; and WATT, *Dictionary of the Economic Products of India*, vol. IV, pp. 186-188. (*Ed.*).

(1) See Abstr. 1866 of this *Bulletin* for June 1911. (*Ed.*)

the results of the investigations made at the school of soap-making at Milan. These investigations dealt with five different qualities of oil.

1. Oil from Apulian grape-pips prepared by the hot process.
2. Oil from same pips prepared by the cold process.
3. Oil from the pips of black and white uncooked grapes (distilled and prepared by cold process).
4. Oil from the same pips boiled and prepared by cold process.
5. Oil from pips of black and white grapes crushed by cold process.

The yield varies considerably according to the quality of the pips used, - from 12 to 20 % on an average.

The oils from distilled grape residuum are much the darkest. The quality of the oil obtained by the cold process differs from that obtained by the hot. The former has a mild, slightly alcoholic odour, is agreeable to the palate, and might even be used for cooking on the same footing as inferior quality olive-oil. Oil extracted from grape-pips by the hot process has a disagreeable smell and flavour and is only useful for industrial purposes.

Cold grape-pip oil is insoluble in alcohol; but is soluble, in any proportion, in petroleum ether. Its iodine index places it among drying-oils. 1 036 000 quintals of grape-pips are obtained on an average from 28 000 000 quintals of grapes, and they yield about 155 000 quintals of oil (1).

The Sugar Industry in Java (Austrian Consular Report). (Javanische Zuckerindustrie). — *Das Handelsmuseum*, Bd. 26, Nr. 23, S. 362. Wien, 8. Juni 1911. **2252**

At the end of 1910 there were 187 sugar factories in Java (2), and 24 concessions for new ones were granted. In the last five years the area under sugar cane has increased from 146 783 bouws (about 257 800 acres) to 178 298 bouws (313 140 acres). The production has increased from 16 400 000 piculs (about 978 000 tons) in 1905 to 20 400 000 (about 1 214 000 tons) in 1910. The increase is largely due to perfection of methods. From 1900 to 1910 more than 32 million florins (£ 2 $^2/_3$ million) were spent on machinery. **Dutch East Indies**

(1) Compare with the publication on grape-pips: GIULIO PARIS. *I Vinaccioli. Utilizzazione tecnica, composizione chimica.* Le Staz. Sperim. Agrarie ital. vol. XLIV, 1911, p. 669. (*Ed.*).

(2) According to the *Jaarbock voor Suiker fabrikanten of Java*, (15e J. 1910-11, H. T.) there were 184 sugar-factories in Java. The area under cultivation in 1910 was 160 041 bouws, and the production in 1909 was 18 768 928 pikols. (*Ed.*).

The exportation to Japan, Europe, and America has decreased, while that to India, China, and Australia has greatly increased.

Sugar-cane is cultivated in 34 districts of Java occupying 11 % of the area under cultivation: rice occupies 89 %. Sugar occupies more than half the railway traffic in the east of the island.

Machinery comes chiefly from Germany, but to some extent from Holland. The special sacks of 1 metric quintal capacity come from India.

2253 MATTEO SPICA. **Method for the Direct Estimation of Citric Acid in Citrate and Concentrated Lemon-Juice.** (Metodo esatto pel dosaggio diretto dell'acido citrico nei citrati e nell'agrocotto). — *Gazzetta Chimica Italiana*, An. XLI, Parte I, Fasc. IV e V. Roma, 27 Giugno 1911.

Italy This new method is based on the decomposition of citric acid by sulphuric acid, concentrated and heated to 80°-100° C. One molecule of carbon monoxide is given off for every molecule of citric acid, during this reaction. Thus, by measuring the carbon monoxide produced, the quantity of citric acid can be ascertained.

In practice, this test is made with a citrometer, invented by the writer, and consisting of a tap-funnel fitted into an Erlenmayer flask, connected with a modified Schiff nitrometer which the writer calls a gas-citrometer. The test is quickly made by placing 2 gms. of the citrate of lime, or 3 gms. of the lemon juice, in the Erlenmayer flask; by adding sulphuric acid through the funnel and passing a slow current of carbon dioxide through it, carbon monoxide can be obtained; this gas is collected and measured at 0° and 760 mm. in the nitrometer. This test can be made in two hours; the accuracy of the results is greater than that secured by any other method.

The sensitiveness of the test is very high, as 0.1cc., of carbon monoxide, corresponding to 0.00094 gm. of citric acid, is readily detected; whereas in acidimetric analysis, made with hydrochloric acid, 0.1cc. of solution corresponds to 0.0033 gm. of citric acid.

2254 **Peach-drying in Chile** (L'industrie de la Dessiccation des Pêches au Chile). — *Bull. mens. de l'Office des Renseign. Agricoles*, No. 6, pp. 707-710. Paris, Juin. 1911.

Chile The information here given is taken from the *Anales Agronomicos* of Santiago, Chili, 1910.

The fruit-drying industry is widespread in Chili, especially in

the province of Coquimbo, chiefly in the departments of Elqui and Ovalle, where the hot, dry climate and the high elevation promote rapid evaporation and make natural drying possible.

There are two qualities of dried peaches; those which are peeled and stoned before drying (*descarozados*), and those which are peeled and dried with the stones inside (*huesillos*).

The orchards, as a rule, are not carefully attended to, and do not consist exclusively of peach trees. All the varieties of peach-tree grown in Chili produce a downy peach with an adhering stone. When irrigated, but not pruned, the yield is heavy but the fruit is small. Each tree yields on an average 100 kgs (220 lbs). of fruit, the production varying from 50 to 300 kgs. The peaches are gathered a little before ripening. They are piled up in an out-house and peeled by hand. Machinery is little used, as three women do as much work as two machines. After bleaching with sulphur, the peaches are placed side by side on wicker frames and left exposed to the sun, wind and night dew for three or four days. When feasible, the wicker frames are hung up under a shed.

The stones are removed with a short triangular-bladed knife, the smaller peaches are dried with their stones, and the fruit is again placed on the wicker frames and left there for three days, at the end of which the drying is completed. They are then stored on shelves until they are packed.

10 kgs of fresh peaches give 2 kgs. of peel, 1 kg. of stones and 2 kgs. of dried fruit.

The annual output of stoned peaches can be estimated at 3000 " fanegas " of 69 kgs. each, or 207 tons; and the output of " huesillos " at 500 " fanegas " of 80.5 kgs, or about 40 tons.

Lastly, some retarded flowers produce small peaches which do not fully develop, and are about the size of a cherry, but very fleshy and with a very small stone with no kernel. These are called " almendrucos ", and are considered a delicacy.

G. Fraser (Brit. Consul.) **Canning in Baltimore**. — *Diplomatic and Consular Reports*. No. 4634, pp. 1-49. London, April, 1911. 2255

Fully 80 per cent of the canning of fruit, vegetables, jellies, preserves, condiments and oysters in the United States is done in Baltimore. United States

The greatest rise, in 1910, took place in the staple articles, such as tomatoes, peas, corn, and peaches, which represent 80 to 90 per cent of the production of all canned fruits and vegetables in the United States.

At a meeting of the National Canners' Association, held at Atlantic City, it was decided to issue a trade-mark and guarantee of purity, to be affixed to every can of the products packed by the members of the Association. The purpose was to assure the consumer that the contents of the can on which it appeared had been sterilised and preserved solely by heat, and were absolutely pure. This proposal however, fell through, being considered superfluous and unnecessary, so long as the manufacturer of food products is compelled under the United States Pure Food Law to guarantee the purity of his goods before he can export from one State to another, which is believed to be much more efficacious than the proposed trade-mark.

2256 **The Snuff Industry of Bavaria, Schmalzler Snuff.** — *Journal of the Royal Society of Arts*, No. 3060, pp. 866-867. London, July 14, 1911.

It is in the mountain districts of Germany that snuff-taking is general, and it is in such districts that most of the forest areas of the country are found. In the forests, as a rule, smoking is forbidden, and this may account for snuff-taking superseding tobacco smoking. A considerable portion of Bavarian tobacco is made into snuff: there are several factories in Nuremberg that make as pecialty of the so-called "Brazil-roll tobacco"; and in Landshut and Regensburg there are half a dozen factories having a considerable output of an especially favoured brand of snuff, known as "Schmalzler", so named because the main ingredient, after tobacco, is grease.

ermany: Bavaria

Pine needles, or other similar ingredients, are often added as flavouring. About 100 000 kil. of Schmalzler are consumed in the district annually. The production of the factories at Landshut and Regensburg is somewhat larger, but not very much; for the Schmalzler is largely consumed at home. A good deal of tobacco comes from Brazil. In recent years however, considerable quantities of Bavarian tobacco have been made into the so-called Brazil-rolls, and eventually ground and mixed into the Schmalzler.

2257 **Apples and Broccoli Packing and Grading for Market.** — *The Journal of the Board of Agriculture*, No. 4, p. 318. London, July, 1911.

Great Britain

One of the subjects discussed at the Annual Conference of the National Federated Associations of Fruiterers and Florists, held at Manchester in May 1911, was the packing and growing of fruit. The following recommendations were made with regard to the packing of apples and broccoli:

Apples should not be purchased unless packed in ½ cwt. boxes, of the same type as those used in California, with the name and address of the sender, the net weight and the name of the apples marked on each box.

Preference will be given, in purchasing, to packers or growers who grade their apples as *Firsts*, *Seconds* and *Thirds* or roughs.

For *dessert* the apples marked *First* should be not less than 2 ½ in. in diameter. For cooking, *Firsts* should not be less than 3 in. diameter.

The best marketable varieties to grow are : For dessert : *Cox's Orange Pippin, Worcester Pearmain, Ribston Pippin, Blenheim Orange.*

For cooking: *Bramley's Seedling, Normanton Wonder, Lord Derby, Lord Suffield, Lane's Prince Albert.*

Broccolis hould not be purchased unless packed in even dozens, in non-returnable crates, after the French type. A crate should contain two dozens, and the name and address of the sender and the number of broccoli should be stated on each crate. Preference will be given in purchasing to growers who trim their broccoli properly before packing. Preference will be given in purchasing to growers who grade broccoli ; *Firsts*, *Seconds* and *Thirds* or roughs ; and who give under *first* grade close compact heads, free from blemishes and of uniform size (1).

LEON BUSSARD and ANDOUARD. **Adulteration of Pepper-Corns.** 2258
(Une falsification du poivre en grains). — *Annales des Falsifications*, An. IV, No. 31, pp. 263-266, Paris-Genève, Mai, 1911.

In examining samples of black pepper-corns taken of recent years in France by the pure-food inspectors and by the seed-testing stations, the presence of foreign seeds, always of the same kind, has been noted.

The writers identify these seeds with those of a bitter vetch (*Ervum Ervilia*), widely grown in the south of France. **France**

In its natural state, the seed of the vetch, similar in size to a pepper-corn, is of an irregular globular shape, often almost tetrahedal; it is of a rusty gray colour ; its oval-shaped hilum is about one twelfth of its circumference. It tastes much like an ordinary lentil.

For purposes of fraud, its appearance and organoleptic characteristics are modified by special treatment. A hot taste, similar to that of pepper, is imparted to it by steeping in an extract of capsi-

(1) Compare: G. BELLETRE, *Le Marché Anglais des Fruits et la Cooperation des Agriculteurs*, Paris (1910), abstracted in *The Science and Practice of Farming during* 1910 *in Great Britain.* Intern. Inst. of Agriculture, Rome, 1910, p. 306. (*Ed.*).

cums; it is then slightly roasted, which gives it a blackish colour and wrinkles the surface so that it looks much like a pepper-corn.

This fraud can invariably be detected by the microscope, and frequently even with a lens. The starch grains of the vetch have the general characteristics of those of the genus *Vicia*, whereas those of pepper are very small and generally polyhedric. Chemically the vetch differs from black pepper by a much higher starch and nitrogen content; and by a much lower proportion of cellulose.

2259 **Ordinance of March 17, 1911, on Food Inspection, etc. in Denmark.**

Denmark

The Minister of Justice, in virtue of the authority conferred on him by the Act of April 18, 1910, for the inspection of food, etc., has arranged with the Analytical Laboratory of V. Stein, of Copenhagen, for said laboratory to make, from April 1st, 1911, all the analyses of foods etc., required for the enforcement of the above mentioned law, and therefore enacts, in conformity with § 3, sentence 2, of said law, the following measures:

§ 1. Samples of food stuffs on sale to the public, that is to say, of all foods or drinks intended for human consumption, including drinking water; samples of patent medicines to be taken internally; and, subject to conditions to be subsequently made known by the Minister of Justice, samples of objects in current use, such as household utensils, and toys which might be injurious to health, may be forwarded at any time from the above mentioned date for examination to the aforesaid Laboratory, of which the address is 12 Norrevoldsgade, Kopenhagen, K.

All communications to the Laboratory must bear the superscription "Legal examination" on the envelope, or at the head of the sheet.

§ 2. All samples sent for examination must be sent carriage paid, and in a parcel so closed that if the police-officer concerned possess a seal this can be used for sealing it. Samples must be accompanied by a request containing an accurate statement of the kind of information in view of which the examination is asked for; and, when necessary, it must state the conditions under which the goods were sold, the price, and other circumstances which might be of importance in estimating the quality of the goods as compared to their sale price, or which might help to decide between the intention of fraud and differences in quality. The request for examination should be made on printed forms, distributed gratis on request, by the Superior Council of Hygiene, 2 Kalvebod Brygge, Kopenhagen, B.

For each sample submitted, a request must be drawn up in duplicate, the original to be forwarded to the laboratory with the sample, and the copy to be kept by the sender.

Should special packing be requisite for sending the sample, it will be supplied by the laboratory on request.

§ 3. In conformity with §3 of the law, samples of products and objects designated under §1 of this ordinance, are generally obtained by purchase of the goods in question, made by the police authorities; but the the latter may receive samples supplied them gratis with a request for examination.

In the case of drinking-water no indemnity is paid. Until experience shall have shown within what limits it is desirable to extend the examination of drinking water, samples should only be submitted when there are special grounds for supposing that the water in question is injurious to health; the sample is to be sent in accordance with the rules laid down in §4, last sentence.

When the police authorities themselves purchase the goods in question, the officer as soon as he has purchased the sample, must inform the salesman that the purchase has been made to obtain a sample for analysis.

The sample is to be immediately sealed by the police-officer; If the salesman so desires, half the amount purchased is returned to him before the sample is sealed up by the police-officer; who is to enquire of the salesman whether he wishes to place his own seal on the portion of the sample intended for analysis; should he so wish, he is entitled to do so.

The police-officer shall then and there write down the date of purchase, the name of the salesman and the price paid, and place below his signature; and should the salesman so desire he shall do the same with the portion of the sample intended for counter-analysis. If these statements cannot be written on the parcel itself, they shall be written on a label to be affixed thereto.

When samples of household utensils, toys or suchlike are purchased for examination, which cannot be readily divided into parts, the police-officer shall, at the request of the salesman, purchase a second sample of the goods in question and treat it in the manner above described.

§ 4. Before purchasing the sample in the manner above described, the chief of police concerned shall enquire of the laboratory whether it be in a position to receive the samples in question at the stated date. Should this not be possible, the laboratory must state when it would be able to receive the sample. If it can receive it, the laboratory must supply the requisite in-

formation as to the taking of the sample and its dispatch, and indicate what quantity is required for analysis.

The police authorities concerned must supply the laboratory with all the information it may desire to facilitate replies to the enquiries made; and must also take the steps which the laboratory proposes, with a view to supplying more and better material for comparisons in special cases.

§ 5. The provisions of §§4 and 5 do not apply to examinations made for the detection of suspected frauds or irregularities. In such cases, the rules hitherto in force are applicable; but the authorities may, when circumstances permit, follow a procedure analogous to that indicated under §§4 and 5.

§ 6. Expenses entailed in purchasing and forwarding samples, in conformity with the law of April 18, 1910, on the inspection of food stuffs, are reimbursed by the Ministry of Justice when the half yearly settlement of accounts is made with the police authorities concerned, as transmitted to the Ministry through the agency of their department.

§ 7. This ordinance comes into force on April 1, 1911, from which date the ordinances of September 1891, fixing for October 1, 1891, the coming into force of the law of April 9, 1891, on the inspection of food, etc., and regulating the procedure of the police in purchasing samples for analysis, and the ordinances of September 25, 1903, of March 28, 1905 and of September 17, 1910, concerning the inspection of food-stuffs, etc., are annulled, conformably with the laws of March 27, 1903, and April 18, 1910.

From the Ministry of Justice, March 15, 1911.

2260 Mr and Mme DURIER. **The Repression of Frauds in Russia. Bill on Sugared Wines and Grape Wines. The Viticultural Regions of Russia.** (La répression des fraudes en Russie. Projet de loi sur les Vins sucrés et de Raisins. Les Régions viticoles de la Russie). — *Annales des Falsifications : Bull. Intern. de la Répression des Fraudes,* An. IV, N. 31, pp. 173-178. Paris, Mai 1911.

Russian Empire

A bill on food products has been drafted by Mr. B. E. Tairoff. The section relating to wines has been discussed by three successive congresses at Simferopol in Nov. 1901, Moscow, February 1902, and Odessa, February 1903; then by a special Board presided over by Mr. A. H. Steven; it was submitted in 1907 to the Viticultural Committee of the Department of Agriculture; finally, in Ja-

nuary, 1907, the bill was approved by a Board presided over by Senator G. S. Kristin.

It will soon be placed before the Council of Ministers and then introduced into the Duma.

We quote some of the provisions.

« The addition of sugar to must to obtain table wines is allowed for 10 years from the promulgation of this law in all the wine-growing regions of Russia, except in Crimea, Transcaucasia, Turkestan, the domains beyond the Caspian Sea ; and also in wine producing countries in very bad years, but only when the consent of the viticultural committees has been obtained. The amount of sugar allowed must not exceed 6.5 %.

. . . . . .

« The viticultural regions of Russia are defined as the Governments of Bessarabia, Poldolik, Kerson, Ekaterinoslav, Taurida (Crimea), Astrakhan, and Stavropol ; the provinces of the Don, Ural, Transcaspia, Syr-Daria, Ferghana, Samarcand, Northern Caucasia, and Transcaucasia. »

. . . . . .

« The viticultural stations and chemical laboratories shall analyse the wines, musts, and other products of the vine of which they shall take samples during their visits of inspection.

« Until such institutions have been established, the viticultural committees shall avail themselves of the services of similar institutions, such as the viticultural station of Odessa; the laboratories of the viticultural schools of Bessarabia, Nikitsk and Varsarinsk ; the laboratories attached to the Agricultural schools dependent on the Direction of Rural and Agricultural Economy, the laboratories of the Ministries of Finance, Commerce and Industry, and the municipal laboratories and boards of health »,

The bill gives a definition of raisin wine ; it prohibits mixtures with raisin wine; it prohibits designating sparkling-wines by the name of Champagne; and lays down rules providing that no wine may be sold for church purposes that is not prepared in accordance with the prescriptions of the Holy Synod. It gives a list of lawful and prohibited practices; and forbids selling Russian wines, and Russian wines mixed with foreign wines, as foreign wines, etc. etc.

The bill provides the means for inspection and control and determines the penalties incurred for infraction of its provisions.

2261 ABEL FLORENS. **Lead in Tins, and the Manufacture of Receptacles for Food**. (Le Plomb dans la Vaisselle d'Etain et la Fabrication des Récipients destinés à contenir des denrées alimentaires). — *Annales des Falsifications*, An. IV, N. 31, pp. 286-287, Paris, Génève, Mai 1911.

France

The Superior Council of Hygiene of France, at its meeting of March 13, 1911, after discussing the opinion it had given that the presence of lead is admissible in the composition of tins, passed the following resolution:

That legislative measures be taken for the regulation of the manufacture and sale of tins and utensils, which, when used in the preparation, conservation, and sale of drinks and food-stuffs, may be dangerous to the public health.

2262 **Artificial Greening with Copper Salts of Canned Vegetables in Different Countries.** — *The Canner and Dried Fruit Packer*, No. 25, p. 42. Chicago, June 29th, 1911.

The first modern pure food law enacted by any country became effective in Germany. This law contained a clause prohibiting the use of copper for artificially coloring canned vegetables.

Germany. Russia. Switzerland. Austria. Italy

Other nations, in following Germany's lead in introducing food legislation, adopted similar regulations as to copper; but although Germany still prohibits copper for this purpose, only Russia and Bulgaria agree with her. The other nations of Europe, either have no regulations on this subject, or permit the use of copper within certain limits. In Switzerland, canned vegetables may contain as much as 100 milligrams of copper per 1000 grams of dry substance without declaration. In Austria, not more than 55 milligrams per 1000 grams of dry substance is permitted in vegetables or fruits. Italy permits 100 milligrams per 1000 grams. England and Portugal have no legislation on the subject. In France the use of copper, originally prohibited, is now allowed.

The second International Congress for the repression of adulteration of foodstuffs adopted a resolution permitting 120 milligrams of copper per 1000 grams of fresh vegetables.

GAUTIER and BORDAS. **Inspection of Foreign Cyanogenetic Haricot-Beans Imported into France.** (Inspection des Haricots cyanogénétiques étrangers importés en France). — *Annales des Falsifications*, IV An., N. 31, pp. 285-286. Paris-Génève, Mai 1911. 2263

As a result of the detailed report by Mr. Guignard on hydrocyanic acid in haricot-beans, the Superior Council of Public Hygiene of France issued an order on July 20, 1906, prohibiting the importation of haricot-beans from Java; and only allowing the importation of those from Burma on condition that their hydrocyanic acid content should not exceed 20 mgms. per 100 gms. France

The practical difficulties met with in enforcing these measures, led the Customs House authorities to ask the Superior Council of Public Hygiene of France to decide whether it would not be possible to recognize the injurious varieties by merely examining their external appearance. Messsrs. Gautier and Bordas, reporting on the subject, think that as a general rule a mere examination of the external characteristics of haricot-beans would not enable most of the persons, who would have to attend to it, to distinguish harmless from harmful varieties.

Microscopic examination would supply more accurate data; but it would not exclude the need for measuring the hydrocyanic acid content. Hydrocyanic acid varieties should only be admitted after a quantitative analysis. Some satisfaction could however be given to the wishes of importers by comparing the haricot-beans entered for importation with a series of samples of the most usual varieties of edible beans. Should the haricot-beans not be recognized as belonging to one of these varieties, they should be held back for 24 hours for analysis. This comparison with the principal edible varieties should be made personally by the Chief of the Laboratory Service. These conclusions were adopted by the Superior Council on March 13, 1911.

The Organization of Cold-Storage Transport and Depots in the Different Countries. (L'organisation des transports frigorifiques dans les differents pays). — *Bull. Mensuel de l'Associat. Inter. du Froid.* 2e An. II, Nos. 4-5-6 (15-16-17), pp. 124-153. Paris, Avril-Mai- Juin 1911. 2264

The international Commission of transportation of the International Cold-Storage Association, met on June 1st, 1911 at Paris, for an exchange of views on the organization of Cold-storage transportation in different countries. Germany. Austria. Belgium

The reports from the navigation and railway companies, published in the Bulletin, contain some valuable information. (1)

These reports show that the country in which the refrigerating and cold-storage industry is best organized is Great Britain.

In France, cold-storage depots do not yet exist in all the principal ports, but their erection is being contemplated.

In Germany the depots for preserving perishable goods are of a peculiar description: they are isothermal, and so far are much more used to protect goods against damage by very low temperatures rather than damage by heat.

In Austria, where cold-storage depots are well developed, the sea-ports do not seem to have followed the example set by the large cities, but depots will soon be opened at Trieste, Pola and Fiume. Belgium, Norway and Holland do not possess cold-storage depots. There are some important installations of this kind in the United States and New Zealand.

The following are some further particulars in the reports.

In Germany the ports of Bremen, Bremerhaven-Geestemünde and Hamburg-Altona possess depots for the storage of sea-borne perishable goods, pending their loading in the railway vans.

The depots at Geestemünde and Hamburg, which are used more especially for storing fish, are fitted with real refrigerating rooms. The fish trade is of great importance to these: Geestemünde received 45 791 metric tons of fish in 1910, and HamburgAltona 60 043 metric tons.

Cold-storage has attained a relatively high degree of development in Austria. Recently all the more important cities have provided themselves with large cold-storage depots, adjacent to the markets and slaughter-houses. Vienna and Prague have important refrigerating plants. Pola can boast a depot adequate to meet the requirements of the town and of the naval and military administrations. The Austro-American Co. and the Austrian Lloyd have steamers fitted with refrigerating rooms.

The importation of frozen meat into Belgium is authorised, subject to certain conditions. Antwerp possesses several cold-storage depots. The administration of the Belgian State Railways

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(1) The information summarised in this article, though of great importance, does not give a complete account of the status of the cold-storage industry in the several countries. It only deals with one special point: transportation in refrigerated cars. The informations is supplied by those companies which have replied to the enquiries addressed them by the International Cold Storage Association. (*Ed.*).

does not possess the refrigerating vans required for transporting frozen meat during the summer months.

Canada

The principal ocean ports of Canada, and especially those which do the export trade, now possess excellent refrigerating plant for the storage of dairy products, meat, fruit and fish. The law on cold-storage depots, authorises the Ministry of Agriculture to grant a subsidy to all cold-storage establishments, erected in places where none such exist. This subsidy amounts to as much as 30 % of the real value of the building.

Halifax has a depot of 75 000 cu. ft. for storing fish; and is erecting another of a capacity of 336 000 cu. ft. for produce of all kinds. Port Hawkesbury, Charlottetown, Lockport, St. John, Quebec, Vancouver and Prince Rupert are provided with depots, varying in capacity from 60 000 cubic feet (Lockport) to 800 000 cubic feet (Vancouver). Victoria has two such cold-storage depots : one 75 000 the other 35 000 cubic feet in capacity. Montreal has five of a total capacity of 3 125 000 cubic feet.

Denmark

Denmark has no special depots as a connecting link between the refrigerating railway vans and the cold-storage holds of ships.

Spain

There are no refrigerating vans in Spain; but several companies are being formed to run vans of this description for carrying fish.

France

In France the General Transatlantic Company owns 4 steamers specially fitted for the trade in frozen and chilled produce; the *Messageries Maritimes* have 5 such; the *Cie. des Chargeurs Réunis*, 4; the *Société des Transports Maritimes*, 8; the *Compagnie de Navigation Mixte*, 1. All the important French Navigation Companies are studying schemes in connection with this problem.

There are not more than 150 refrigerator vans now running on the French railways.

The two most important cold-storage depots in Marseilles are those of Saint-Mauront, with a capacity of about 1 500 cubic meters, and that of the Master Pork-Butchers' Syndicate of Marseilles. The municipal slaughter-houses have no refrigerating plant.

The port of Bordeaux possessess two cold-storage depots each with a cubic capacity of some 2 000 meters. The ports of Rouen, Dieppe, Havre, Nantes, and la Rochelle-Pallice either have no cold-storage depots, or those they have are of insignificant dimensions.

Great Britain

Great Britain is the European country which is best organized in all matters connected with cold-storage carriage by sea and land. There are a number of important depots in England, at Bristol, Cardiff, Hull, Liverpool, London, Newcastle-on-Tyne, Plymouth, Southampton, and in Scotland at Glasgow and Leith. The

report, based on notes supplied by Mr. R. M. Leonard, gives an idea of these depots and their capacity.

Hungary In Hungary, the report sent in by the *Adria* company gives no general information. As frozen meat imports are not permitted by the Hungarian Government, the Adria Company has no steamers fitted with refrigerating plant.

French Indo-China French Indo-China has no cold-storage depots. The question of erecting in Cochinchina municipal slaughter-houses with cold-storage depots attached is now under discussion ; and a scheme is being studied for the towns of Cholon and Saïgon.

Norway In Norway the Nordenfjeldske owns three steamers fitted with Helm refrigerating chambers, kept at a temperature which varies between 0° and + 3° C., for storing fish ; which is thus chilled without being frozen, which deteriorates its quality.

Netherlands There are no cold-storage depots yet open for public use in the Dutch ports as a connecting link between sea and land refrigerating cars and chambers. A fairly large plant now exists in Amsterdam, but it is only used for local needs.

Servia The Danubian ports of Servia possess no cold-storage depots.

N. Zealand New Zealand exports large quantities of meat and dairy produce. Cold-storage is therefore organized solely in view of the exportation of frozen products. All the large ports of New Zealand are fitted with refrigerating plant. Meat is transferred from the refrigerating chambers to the steamers on "isolated" cars which are cooled by a current of cold air before being laden.

The laws of New Zealand require that ships used for transporting meat and other perishable produce be adapted to this use. There are now 49 steamers capable of carrying 4 ½ million carcases, engaged in carrying frozen meat between New Zealand and England. (1).

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(1) In New Zealand, in 1905, the capital employed in meat freezing and preserving was £.4 928 545 *The Statesman's Yearbook for* 1611, p. 336.

Italy In Italy the *Lloyd Italiano* and the *Navigazione Generale Italiana* possesed in 1909 refrigerating chambers of a cubic capacity of from 200 to 400 cub. meters, used for storing food for use on board and for the trade in frozen meat.

The *Società Anonima dei Magazzini frigoriferi genovesi* owneds some refrigerating cars; in 1902 it erected cold- storage depots in the port of Genoa, these were enlarged in 1905 and now afford 5 400 cu. meters of space.

See U. FERRETTI. *L'industria del freddo.* Rocca S. Casciano, 1909, pp. 293. passim. (*Ed.*).

Agricultural Engineering and Farm Machinery and Implements.

Agricultural Machinery in Cochin China. (Cochinchine, Agriculture-Chambre d'Agriculture). — *La Quinzaine Coloniale,* An., XV, N. 13, p. 473. Paris, 10 Juillet 1911. 2265

The Chamber of Agriculture of Cochin China recently passed a resolution favouring the abolition of import duties on agricultural machinery coming from abroad and which cannot be obtained in France. If this request cannot be granted, the Chamber proposes that prizes be awarded for the importation and experimentation of implements used in mechanical cultivation. The prizes should amount to about the same sum as the import duties, and would consequently be nearly equivalent to relief from duty. French Indo-China

E. Deligny. **Automatic Disconnection of Gearing in Agricultural Machinery.** (Débrayage automatique pour machines agricoles). — *Journal d'Agriculture pratique.* 75 An., F. II, N. 28, pp, 48 49. Paris, 13 Juillet 1911 2266

Mr. T. Ballu has devised means for preventing danger in disconnecting gear in certain agricultural machines, and he has studied an automatic device for throwing out of gear, or in gear, machines fitted with a seat for the driver. France

The seat is made to turn on a pivot, and the inventor utilises automatically the weight of the driver. When the seat is empty, it is thrown forward and disengages the gear of the machine by means of a controlling device. But when the seat is occupied, the weight of the driver pushes it back to a point where it is stopped by a screw (*vis a buttée*); and the machine is automatically thrown into gear by this rotation. A handle connected with this device is within reach of the driver, so that he can throw the machine out of gear without having to leave his seat.

2267 **A Machine for Felling Trees.** — *The Agricultural News*, Vol. X, No. 233, p. 105. Barbados, April 1, 1910.

A means for felling trees was invented by Mr. A. Ransome some years ago. It consists of a cross-cut saw, worked by steam from a cylinder with a long stroke, which is mounted, and arranged to turn on its centre in the direction required, by means of a hand wheel. Great simplification of the apparatus arises from the fact that the saw is fixed to the end of the piston rod, so that there is no need for a crank shaft, connecting rod, or fly wheel. The steam reaches the cylinder through a flexible hose, which is sufficiently long to allow the machine to be worked over an area of an acre without moving the boiler; although displacing the boiler is comparatively simple, as the boiler itself is mounted on broad wheels. The machine is also easily moved from place to place, four men only being required for the purpose, while the saw with which it is fitted can fell trees up to 7 feet in diameter.

For the purpose of working, the whole apparatus requires three men only — to attend to the boiler, the cylinder and the saw respectively. Lastly, the working parts of the machine can be fitted into a special frame, by which means it can be employed for making vertical cuts, or for cross-cutting trees after they have been felled.

2268 **Ordinance concerning Means of Preventing Accidents in the Use o Agricultural Machines in the Duchy of Salzburg, Austria** (Verordnung des k. k. Landespräsidenten in Salzburg vom 28. Jänner 1911, Z. 1.170, betreffend die Verhütung von Unfällen in landwirtschaftlichen Maschinenbetriebe). — *Landesgesetz- und Verordnungsblatt für das Herzogtum Salzburg*, J. 1911, VII. Stück. 16. Februar 1911.

An ordinance of the President of the Provincial Diet of Salzburg, intended to lessen the frequency of accidents with agricultural machines, was issued on the 28th of January 1911, pending legislation on the subject.

Austria: Salzburg

The following are its chief provisions:

I. Regulations concerning construction.

§ 1. *General Regulations.*

1) In all machines, fly-wheels, cog-wheel gearing, band and chain connections, as well as all cutting, breaking, and beating parts

serving for the immediate purpose of the machine, which are not already covered in the construction, must be so protected that all dangerous contact becomes impossible.

2) Traction engines working on steep roads must be provided with efficient breaks (screw-breaks).

3) Traction engines must be provided with a lever system for lowering and raising the funnel without danger.

4) Gas and oil engines, with fly-wheel of more than 5ft. 3 ins. outside diameter, must be provided with a mechanical starting-apparatus.

§ 2. *Winches.*

The poles of winches must be at least 20 ins. (50 cm.) above the track. The gearing, axle-trees and transmittors must be solidly covered with iron or wood, unless the principal axle-wheel has its cogs inside and is solid.

Transmission-shafts up to 6 ft. high, (m. 1.80) and all free parts connected with them (cog-wheels, band-wheels, cog-connections, indispensable wedges, projecting screwheads), also bands over 2 ½ ins. (60 millim.) wide, must be protected, the last-named up to a distance of at least 5 ft. (m. 1.50) from the middle of the band-wheel.

Transmission-shafts below the level of the ground must be roofed over.

Fly-wheels and band-wheels must have their spokes protected.

For disconnecting the bands, or turning them into free wheels, there must be some device ensuring easy ungearing without danger.

§ 3. *Thrashing-Machines.*

Besides conforming with the general regulations, thrashing-machines must be arranged according to the following:

a) Side-feed machines, with side movement of the drum:

With these machines, in which the feeder stands on or a little above the ground, the feeding-mouth must have such a length that the man cannot reach the drum from his place. The drum must be covered by a hood above.

b) Machines fed from.

Hand-fed machines must have the mouth protected all round by a board 20 ins. (50 cm.) high. If the standing-place is 20 ins. (50 cm.) below the mouth, the board may be omitted on the feeding side. In this case, the mouth may be protected by a hood, reaching 4 ins. (10 cm.) above the opening, or by sliding covers.

The platform must be protected all round by a removable railing 20 in. (50 cm.) high; during work, this may only be taken off on the side from which the sheaves are pitched.

The ladders for climbing to the platform must have iron rungs, and must reach 3ft. (1 metre) above the platform.

Portable thrashing-machines, travelling on steep roads, must have efficient screw-breaks (Cf. § 1.).

§ 4. *Chaff-cutters.*

These machines must have the feeding-apparatus so covered that the man feeding the machine cannot reach the knives.

Free moving parts must be protected as in § 1.

Machines not worked by hand must also have the upper part of the cutting-apparatus covered.

The ungearing apparatus must be such as to allow of instantaneous stoppage or reversing of the machine.

When machines are not working, the fly-wheel must be fixed so that incompetent persons cannot set it going.

§ 5. *Circular saws.*

The saws must be surrounded by a protective apparatus.

Vertical saws must have a fixed sheath along the back of the blade.

§ 6. *Hydraulic Machines and Farm Turbines.*

With hydraulic machines the regulations in § 2 with regard to winches must be observed, also the following:

a) The turbine, or water-wheel, must be capable of easy and certain stoppage.

b) There must be a proper means of signalling from the wheel to the machine-room that the turbine is being started.

c) Besides the band-wheels on the transmission-shafts, there must be strong supports and attachments for the band when not in use.

d) The ungearing of the transmission from the wheel to the machine must be certain and performed without danger.

During repairing and during new installation of water-power for agricultural machines, the wheel must be entirely covered over and screened so that men and tools cannot possibly fall in the turbine-chamber behind the wheel.

II. Precautionary measures.

§ 7. *General Regulations.*

1. The workmen actually attending to the machines must have close-fitting clothing and proper boots.

2. Persons not attending to the machines must not come near engines under steam or electric motors, even while the machines are at rest, as the touching of certain parts by inadvertance would suffice to set the machines in motion.

3. It is absolutely forbidden to employ at winches or near agricultural machines weak-minded persons, idiots, epileptics, blind or deaf persons, or those subject to giddines and fainting. Children under 14 may not be employed at winches or agricultural machines, or even at accessory work which would bring them within reach of danger. Notices to warn unauthorised persons from approaching should be put up.

4. If machines are set up under cover, sufficient space must be left to allow the machine to be attended to without danger.

5. In all agricultural machines in which the power is not applied direct, a signal must be arranged; and the machine must not be started till the signal has been given.

6. During working, bands may not be put in or out of action simply by hand; nor may parts in motion be lubricated by hand.

7. Steam engines must only be worked by experts. Locomotive-drivers must be qualified mechanics; where the engineer has also to look after the thrashing-machine, he must have a stoker.

8. Steam-engines may only be moved when there is no pressure on and when the fire is out.

§ 8. *Winches.*

In cases of stoppage of winches, or of machines worked by them, also for oiling, and all operations which can only be undertaken safely while the machine is at rest, the draught animals must be unhitched.

§ 9. *Thrashing Machines.*

The feeding-mouth of the thrashing-machine may only be open during the actual feeding of the machine.

No internal manipulation may take place till the machine is completely at rest (Cf. § 7).

During thrashing, the workman must be allowed goggles.

III. Final general Regulations.

§ 10.

In the construction and installation of all kinds of engines for agricultural purposes, and also in the storage of fuel for motors, the general laws relating to them, and the safety regulations for electrical work, recognized by the authorities must be com plied with.

§ 11.

Owners of agricultural machinery, or their representatives (bailiffs, foremen, etc.) are responsible for the carrying out of these regulations. If the owner has fitted up the protective appliances required by this law, and has ordered their use, the employees and workmen are responsible for their proper employment, and attending to the necessary precautions in the working of the machines. These regulations are equally applicable to persons using borrowed machines, unless the lender is himself directing operations.

§ 12.

Failure to comply with these regulations, unless punishable under the general Penal Code, is punished by the authorities with a fine of 2 to 200 crowns (2*s* to £ 10), or with imprisonment for 6 to 14 days.

§ 13.

This ordinance comes into force on May 1st. 1911. For the installation of the control of chaff-cutters (§ 4), three years from the publication of the ordinance are allowed.

§ 14.

This ordinance is to be brought to public notice in all the Communes of the Duchy of Salzburg,

PLANT DISEASES

NOXIOUS INSECTS AND OTHER PESTS.

INTELLIGENCE

Phytopathological and Entomological Stations.

Temporary Entomological Stations against Vine Pests in France. 2269
(Stations Entomoogiques temporaires en France). — *Journal officiel de la République française*, 43e. An., No. 199, pp. 6246-6247. Paris, 25 Juillet 1911.

The French Ministry of Agriculture, by decree of February 10th 1911, has set up five temporary Entomological Stations for study and experiments on the best methods for the destruction of *Cochylis* and *Eudemis*, France

These stations are at Châlons-sur-Marne, Beaune, Montpellier, Bordeaux, and Blois. The directors of the Stations have been chosen from among specialists and entomologists with all the necessary qualifications.

Numerous experiments and observations have been made on the subject of treatment of the first brood. These have been principally concerned with the action of insecticides previously employed, and on the conditions under which they give the best results.

A number of new substances have also been tried, but so far nicotine has given better results than anything else. Pyrethrum, pyridine, and carbon disulphide emulsions are under trial.

The study of the life-history has yielded interesting points on the egg-laying, the feeding of the moths, the attraction of light for the moths, and changes of habits in the caterpillars (1).

(1) See Abstr. 1948 of the *Bulletin* for June, *1911*. (*Ed.*).

Work on the natural enemies of the two vine-pests has been undertaken, with a view to determining means of protecting these useful auxiliaries, and of encouraging their increase.

Observations on the second brood were in progress, at the time of writing, at all the stations, as well as at the Paris Entomological Station ; the director of the last named undertakes the collection and collation of the results of his colleagues.

As the work will continue to the end of the year, the Ministry of Agriculture has not deemed it possible to submit precise instructions for the organization of the campaign against *Cochylis* and *Eudemis* to the Professors of Agriculture. The latter have, however, given advice on the best treatments yet known, adapting them to the circumstances and to the cultural conditions of the different departments concerned.

Non-Parasitic Diseases of Plants, and Diseases of unknown Origin: Their Control.

2270 C. Crowther and A. G. Ruston. **The Nature, Distribution and Effects upon Vegetation of Atmospheric Impurities, in and near an Industrial Town.** — *The Journal of Agricultural Science*, Vol. IV, Part I, pp. 25-55, 3 figs. Cambridge, May, 1911.

This article contains a summary of investigations and observations that have been made during the years 1906-1910 in part at the Manor Farm, Garforth (Experimental Farm of the University of Leeds and Yorkshire Council for Agricultural Education), and also in various parts of the city of Leeds.

Great Britain: Yorkshire

The work comprises a three years' series of analyses of rain samples, collected at Garforth; a twelve months' series of analyses of rain samples collected at Garforth; a twelve months' series of analyses of rain samples collected at the different stations in Leeds; and a variety of investigations and observations upon the effects of certain classes of atmospheric impurities upon vegetation.

Attention may be directed specially to the following points, brought out clearly by the investigations :

1) The atmosphere in and around a large industrial city such as Leeds is relatively highly charged with impurities, many of which exert a marked deleterious effect upon plant growth.

2) The impurities are most abundant in the industrial quarters of the city, but are disseminated over very large areas, especially in the direction of the prevailing winds.

3) The rain falling through such a polluted atmosphere becomes notably rich in suspended matters, chlorides, sulphates (often also other sulphur compounds, such as sulphur dioxide), nitrogenous compounds (notably ammonia), and free acid.

4) The suspended matters in the air impede the growth of plants: not only by their deposition upon the leaves and consequent hindrance to the free passage of gases into and out of the leaves; but also by reducing the intensity of illumination on the leaves, such reduction amounting in the worst case investigated to fully 40 per cent of the maximum light available.

5) The presence of free acid in the atmosphere exercises a detrimental influence upon plant growth by direct action upon the leaves; and indirectly, by reducing the activity not only of the necessary ammoniacal fermentation of the soil humus, but even more of the beneficial nitrifying and nitrogen-fixing organisms in the soil.

6) The experiment with the perennial meadow grass, Timothy, indicates that with the continued application to the soil of acid rain the produce becomes distinctly poorer in protein and richer in crude fibre, and consequently less nutritious. If this holds good for meadow grasses in general, it is a matter of great practical importance as bearing upon the nutritive value of meadow hay, grown in smoke-infested areas.

C. L. GATIN. **Influence of Road-tarring on the Trees in the Bois de Boulogne.** (Influence du goudronnage des routes sur la végétation des arbres du Bois de Boulogne). — *C. R. de l'Acad. des Sc.*, T. 153, No. 3, pp. 202-204. Paris, 17 Juillet 1911. **2271**

In several cases, attention has been drawn to the pernicious effect of tarring roads on the neighbouring vegetation (1). **France: Paris**

The writer has made observations on the subject in the Bois de Boulogne, Paris.

(1) See p. 391 of the *Bulletin* for Dec. 1910; and Abstr. 281 and 282 of the *Bulletin* for Jan. 1911. (*Ed.*)

Trees beside or near the tarred parts can be distinguished by the more stunted appearance of the foliage ; the leaves are smaller and often curled or spotted, sometimes even ragged ; the leaves or petioles fall earlier, and the year's shoots are less vigorous. The upper parts of the trees are less affected than the lower.

A number of measurements on *Catalpa bignonioides*, *Robinia Pseudo-acacia* and its variety *monophylla*, and other trees, show the effects of proximity to a sunny and much-frequented tarred road.

The measurements for *Catalpa bignonioides* are as follows :

	Trees in the un-tarred part	Trees in the tarred part
Number of leaves on year's shoot	13.5	11.2
Breadth of leaf (cm.)	10.2	9.3
Length of leaf (cm.)	20.9	14.6
Length of leaf-blade (cm)	15.1	10.0
Leaf-surface of a year's shoot (measured directly in sq. cm.)	956.4	495.7

The writer also succeeded experimentally in browning the leaves of the rose and sycamore.

It is not, however, possible yet to decide what part is played by vapours and what by dust in the stunting action. It appears that along some of the roads, for instance the « allée de Bagatelle » and the « allée des Fortifications », which are shaded and little frequented, no damage has resulted from tarring.

It seems clear, therefore, that it is only in certain cases, particularly along sunny roads where there is a great deal of traffic, that tarring has a pernicious effect on the neighbouring plants.

2272 United States

« **Tipburn** », **a Disease of Potatoes in the United States.** See Abstract 2295 this *Bulletin*, July, 1911.

2273

G. MÉNARD, **Effect of Drought on Sugar-Beets** (Effets de la Sécheresse sur les Betteraves à sucre). — *Journal d'Agriculture pratique*. 75e An., T. II, No. 30, pp. 109-110. Paris, 27 Juillet 1911.

France

While hot dry weather at the end of the season is very good for sugar-beets, drought at an early stage may greatly reduce the crop. The first ill-effect seen is a wrinkling and curling of the oldest

leaves while they are still green and firm; then a yellowish green discolouration of the edge begins at the tip of the leaf, and changes to yellow and then brown, whilst the leaf droops and dries up. The growth of the whole plant becomes slower; and the central leaves finally cease growing, owing to lack of moisture as well as to concentration of the soil-solution.

As the period of drought progresses the withering becomes more rapid; the younger the beets, the more serious the damage.

Dry weather is generally accompanied by attacks of lice (*Aphis Papaveris*), which are difficult to get rid of; they play some part in the curling of the leaves, which is the first sign of damage from drought.

As preventive means, the writer recommends deep winter tillage, heavy dressings of farmyard manure, careful selection of varieties of beets suited to the soil, early sowing, and singling out rather further apart. When drought has set in, repeated hoeing is all that can be done.

A. SPLENDORE. "**Bassarà**" **or** "**Verderame**" **of Eastern Tobaccos in South Italy**. (Bassarà o Verderame dei Tabacchi orientali). — *Boll. tecnico della coltiv. dei Tabacchi, Istituto sper. Scafati* (*Salerno*). An. X, No. 3, pp. 141-142, 1 tav. Scafati, Maggio-Giugno, 1911. **2274**

The green patches of various sizes which occur on Levantine varieties of tobacco-leaf are known in Macedonia by the name of "Bassarà", or "Verderame". **Italy: Lecce**

These green patches stand out from the golden-yellow colour of the leaf; sometimes they are isolated and very few in number; sometimes they are grouped and numerous; flat and smooth in some cases, in others they are like blisters. They generally appear on the middle part of the leaf, while the base, tip and edges are generally free. These patches are not easily seen as long as the leaf is attached to the plant; they gradually show up as the leaves dry, destroying them and making them commercially worthless.

Miscroscopic examination of these spots shows a thickening of the mesophyll, more especially of the palisade tissue, which is very rich in green pigments and in starch granules, as compared with normal tissue.

The disease is often found amongst the Levantine variety of tobacco grown in the Province of Lecce. In the Salentine peninsula, or Terra d'Otranto, all the Oriental tobaccos are affected by it.

Some writers think that this disease is more common on soil on which tobacco has only been grown for a few years, and that repeated crops tend to attenuate it; others are of a contrary opinion.

However this may be, " Bassarà " or " Verderame " reveals itself when the leaves first begin to be cured: whilst the healthy tissue yellows readily, the diseased portions remain green through all the processes to which the leaf is subjected.

2275 J. BERNATSKY. **Further Studies on Chlorosis of the Vine and the Effect of Mineral Fertilizers.** (Nouvelles études sur la Chlorose de la Vigne et l'effet des engrais minéraux). — *Le Progrès agricole et viticole*, 28e An., No. 32, pp. 162-164. Montpellier, 6 Août 1911.

The writer has made four series of experiments.

1st. Series. — Experiments made with a nutritive salt α containing nitrogen, potash, lime, sulphur, sodium chloride and plenty of iron, but no phosphorus. Phosphorus was added later on, in the form of either tripotassic, monopotassic or tricalcic phosphates, in the large ratio of 0.5 gr. of phosphate to 1 gr. of α salt. France

The effects were striking, both on vines and other plants such as varieties of *Tradescantia*, gherkins, and beans, The plants rapidly became chlorotic under the influence of tricalcic and still more of tripotassic phosphates, whereas they remained green when treated with monopotassic phosphates.

2nd Series. — The same salt α was used, but the phosphorus was added in the form of phosphated mineral fertilizers, basic slag or superphosphates.

The results varied. When treated with a small quantity of basic slag (1 gr. to a litre) the plants grew well, though somewhat pallid; but when the dose amounted to 2 or 3 gr. per litre, the plant became chlorotic as under the action of the tricalcic and tripotassic phosphates.

The plants grew very well when treated with superphosphates; but when the concentration was increased to 3 gr. per litre symptoms of the opposite of chlorosis began to appear (terminal shoot of a dark green shade, lower leaves faded).

3rd Series. — Solution α was replaced by a mixture of mineral fertilizers, nitrate of soda and kainit, to which phosphorus was added in the same form as in the 2nd series with like results.

4th Series. — The plants which had become affected by chlorosis in the three former series of experiments, were treated in the following manner:

To the nutritive solutions either phosphoric or sulphuric acid was added. When a sufficient quantity of acid had been added, the diseased plants recovered their vitality in every case, the cure becoming apparent first in the roots and then in the foliage.

Now tricalcic and tripotassic phosphates, and basic slag have a basic reaction, whereas monopotassic phosphates and superphosphates have an acid reaction.

Experiments 1, 2, and 3 show that the plant grows more and more chlorotic in an alkaline medium, and this in direct relation to the basic nature of the medium. In an acid medium, the plant is always intensely green; and if the medium is too acid, pathological phenomena are observed which are the reverse of chlorosis.

The 4th series of experiments shows that a plant which has become chlorotic in a basic medium can recover if the medium be neutralised by the addition of acids.

The writer comes to the following practical conclusion:

Against vine-chlorosis, the use of basic slag is advisable first of all on acid soils and then on neutral soils; whereas superphosphates are advisable on calcareous soil, where they render valuable service, not only in view of their phosphate content, but also because of their acid reaction.

Resistance of the Vine "Rupestris du Lot" to Chlorosis in Hungary. — See Abstract 2151 this *Bulletin* July, 1011. 2276 Hungary

J. E. Coit. **The Brown Spot of the Navel Orange.** — *California Cultivator*, Vol. XXXVII, No. 3, pp. 51-52. Los Angeles, July, 1911. 2277

In recent years « brown spot of the navel orange » has been noticed in California, the losses from this disease having been heaviest from the upper San Gabriel and Santa Ana Valleys. The brown spot has been observed so far only on the Washington navel variety of orange. Spotting is also uniformly worse on fancy, smooth thin-skinned fruit. United States: California

The brown spot of the navel orange occurs irregularly over the surface of the orange; there may be as many as fifty on a single fruit; they average in size about ¼ inch, are irregular in shape, and vary in color from pale brown to almost black, generally lighter near the coast and darker in the interior valleys. The dead and collapsed tissue of the spot extends from the surface to about ¼ the thickness

of the peel. In 1909-1910, no spots were visible while the fruit was on the trees; and as a rule, the spots are not noticeable till from 15 to 25 days after picking. While in a normal way the fully mature orange contains no starch in the peel, the brown spots give a distinct reaction to iodine, showing that in these diseased cells the diastasic action is in some way inhibited.

Nothing has been found so far which would seem to indicate that the brown spot is caused by parasites such as fungi or bacteria. It appears to be a purely physiological disease. In the writer's opinion the direct cause of brown spot is the oxidation of the protoplasm by enzymes which occur in the protoplasm itself, but which are prevented from acting as long as the orange is attached to the tree and receiving water and certain nutritive substances from the tree. Thus the resistance of the protoplasm to enzyme encroachments gradually grows less from the time the orange is picked.

None of the attempts to produce the brown spot by injecting into the peel, with a hypodermic needle, various substances calculated to affect it injuriously, were successful.

Parasitic Diseases. — Generalities. — Parasitism. — Parasitic and Saprophytic Bacteria and Fungi. — Resistant Varieties. — Remedies.

A. de SAPORTA. **The Viticultural Congress at Montpellier: Diseases of the Vine. Copper salts and nitrate of silver in Viticulture. Birds and the development of the Cochylis moth.** (Le Congrès viticole de Montpellier: Maladies de la Vigne. Sels de cuivre et nitrate d'argent en Viticulture. Les oiseaux et le développement de la Cochylis). (Le Congrès viticole de Montpellier). — *Revue générale des Sciences pures et appliquées*, 22e An, N. 13, pp. 516-517. Paris, 15 Juillet 1911. 2278

In the discussion on the diseases of the vine at the Congress at Montpellier (17-20 May, 1911), it was pointed out that, as a rule, the resistance of the leaves of a hybrid to mildew seems to be complementary to the receptivity of its roots to phylloxera. In the case of native stocks, in normal years, only very early preventive treatment is effective, and under certain conditions, which occurred in 1910, all control is impossible, especially when the leaves are young, or bruised by hail. France.

Copper salts are fairly successful in protecting vines; but their use is expensive, as the strength cannot be reduced without incurring great risk. Attempts have been made to evade the difficulty, sometimes by the use of a minimum proportion of a very active fungicide, such as silver nitrate; sometimes by increasing the moistening quality of the mixture, by adding to it oleate of soda, which reduces the surface tension, or by the use of colophony, which acts in a similar manner.

Cochylis and *Eudemis* moths are thought by some naturalists to have increased as the result of too exclusive cultivation of one crop and the destruction of small birds. The Germans are trying to control these pests by protecting birds and with the auxiliary help of parasitic fungi and insect enemies. In France, more direct remedies are required, of which barium chloride, arsenate of lead, and nicotine are the most important. There is no danger of these poisons being present in the wine: except, perhaps, when treatment is given too late in the season.

2279 Great Britain England

Special Sections for Diseases of Plants at the International Horticultural Exhibition of London, 1912. — See Abstract 2052. this *Bultetin* July, 1911.

2280

American Gooseberry Mildew (*Sphaerotheca mors-uvae*) in Canton Vaud, Switzerland. (Le « Blanc » du Groseiller à maquerau (*Sphaerotheca mors-uvae*) dans le Canton de Vaud, Suisse). — *La Terre Vaudoise*, 3e An., N. 27, p. 258. Lausanne, 8 Juillet, 1911.

Switzerland: Vaud

This formidable disease (1), imported into Europe in 1900, and recorded in Switzerland (St. Gall) in 1908, was noted for the first time in 1009 in Canton Vaud (Chexbres) and is again recorded at Tour de Pelz, Chexbres, Cully and Moudon.

2281

Miscellaneous Fungi Found Recently in the West Indies. — *The Agricultural News*, Vol. X, No. 238, p. 190. Barbados, June 10, 1911,

Windward Islands. St. Vincent. Grenada. Dominica. Sta Lucia

Fruit spot of Mango. — The fruits of a mango tree growing in the Botanic Garden, St. Vincent, were observed to be affected by a disease which, in the first stage, took the form of small dark-brown spots; and, in the last, of numerous very small pink or yellowish pustules distributed all over the surface. A species of *Gloeosporium*, most probably *G. mangiferae*, is the cause of the disease. In addition to the spots on the fruits, a dying back of the fruit stalk was often observed, which is probably attributable to the same fungus.

Leaf Spot of Bengal Beans. — Specimens of the leaves of the « Bengal Bean » (*Stizolobium aterrimum*) from Grenada showed the presence of fairly numerous spots, approximately circular in shape and 2-4 mm. (0.08 to 0.16 inch) in diameter. The disease was caused by a species of *Cercospora*. It is possible that this fungus may have other host plants.

Guinea Corn Rust. — Specimens of the rust on Guinea corn (*Sorghum vulgare*) leaves have been forwarded to Kew and identified as *Puccinia purpurea* Cke. — a rust common on sorghums in North America and the West Indies, and also found on Indian corn. Only the uredospores and teleutospores are known, though it is possible that an aecidial stage occurs on some other host plant. The affected spots on the Guinea corn leaves showed the presence of

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(1) See: *The Science and Practice of Farming during 1910 in Great Britain*, p. 356. Intern. Inst. of Agric. Rome, 1910. - See also: page 163 *Bull.* November 1910; pp. 364-365, *Bull.*, December, 1910; Abstract 1885, *Bull.*, June, 1911. (*Ed.*).

small black pycnidia, in addition to the rust fungus. These pycnidia contained hyaline bicellular spores, belonging to a fungus identified at Kew as *Darluca Filum* (Bivon.) Cast. This is a well-known parasite on several of the rust fungi (1). Another species of rust fungus, also reported as occurring on Guinea corn in the West Indies, is *Puccinia Sorghi* Schw., which is supposed to be a native of America and an original parasite of Indian corn. The complete life-cycle of this fungus is known, as its aecidial stage has been found to occur on *Oxalis* and to be identical with *Æcidium oxalidis* Thüm.

Entomophagous fungi. — On the leaves of trees of mango and star apple (*Chrysophyllum Cainito*) in Dominica, and on those of Java plum (*Eugenia Jambolana*) in St. Lucia, a fungus has been found which has been identified at Kew as the conidial (*Aschersonia*) stage of *Hypochrella oxyspora*, Massee. Its method of occurrence on the leaves in St. Lucia, as well as the fact that the leaves did not appear to be much diseased, suggested that it was a parasite on some scale insect, possibly the mango shield scale (*Coccus mangiferae*), which was found on the leaves. This hypothesis is borne out by its systematic position. Two species of *Aschersonia*, to which genus its conidial form belongs, are well known parasites of scale insects and white fly (*Aleyrodes*) in Florida; while several species of *Hypochrella* occur on scale insects in Ceylon and Java.

A mycelium was found to occur on the larvae of a beetle — a species of *Cryptorhynchus*, which tunnels into the stems of crotons, in St. Vincent. As many as 50 % of the insects are said to be attacked normally, so that the fungus must contribute considerably to keeping them in check. No fructification of any kind was found in connection with the mycelium, though there is reasonable ground for expecting that it belongs to a species of the germs *Cordyceps*.

Two Fungi on Limes. — *Polystictus hirsutus* and *Fomes lucidus* were found on dead or dying limes in Dominica. The former is recorded as causing sap rot of red gum (*Eucalyptus rostrata*) timber in the United States (*Bul. No.* 114, *Bur. of Plant Ind., U. S. Dept. of Agric.*), and is usually saprophytic. In identifying the specimens from Dominica at Kew, Massee remarked, however, that this fungus might very possibly be parasitic in habit, and recently it has been found in the United States, as a wound parasite on the mountain ash (1) which it kills by slowly destroying the cambium. It is possible, therefore, that this fungus may attack limes in a similar manner.

(1) V. Orig. G. S. Boulger. *Wood*, p. 134. London, 1908. (*Ed.*).

The second fungus, *Fomes lucidus*, found in Trinidad and Dominica, was not thought to be a parasite when identified at Kew; but Petch has since shown that it is responsible for root disease of cocoa-nuts and of flamboyant trees in Ceylon.

2282 E. G. Britton. **Fungi on Mosses**. *Mycologia*, Vol. III, No. 4, p. 206. Lancaster, Pa., July, 1911.

Cladosporium epibryum, Cooke and Massee, has been found living parasitically on the following species of mosses. *Ulota phyllantha* Brid., *Fabronia andina* Mitt., *Hypnum megaptilum* Sull., *Bartramia Potosica* Mont., *Grimmia ovata* W. et M., *Grimmia Doniana* Sm., *Eucalypta rhabdocarpa* Schwgr., *Bartramia pomiformis* Hedw.

United States: Pennsylvania

The fungus occurs as black septate filaments, protruding from the walls of old capsules, particularly those that have wintered over; and attacks usually species of genera that hold their capsules a long time. In the case of *Ulota phyllantha*, they occurred around the mouth of the capsule, the teeth being distorted and undeveloped.

2283 T. Harvey Johnston. **American Maize Smut.** — *Agricultural Gazette of New South Wales*, Vol. XXII, Part. 4, pp. 319-320. Sydney, April, 1911.

In January 1910, there appeared in the *Agric. Gazette of N. S. W.* a note dealing with « maize smut ». The disease was regarded as being due to the fungus *Ustilago Maydis* (= *Ustilago Zeae*), which is the parasite usually met with on maize. However, as Mr. Mc Alpine pointed out a little later in his « *Smuts of Australia* », the fungus in question was not *U. Zeae*, but a closely related form, *U. reiliana* (= *Sorosporium reilianum*). The latter generally attacks sorghum, its occurrence on maize in other parts of the world being rather uncommon. It often receives the name of « Head Smut », on account of the fact that its presence is usually made manifest by the appearance of smut boils in the inflorescence of the attacked plant. Mr. Mc Alpine, moreover, has emphasised the fact that the American maize smut has not so far been found in Australia.

Australia: N. S. Wales

It is therefore of interest to record that some specimens of an American variety of maize — « Funk's Yellow Dent », sent to the writer at the Bureau of Microbiology, were found to be attacked by the true *Ustilago Zeae*.

PAUL JACCARD. **Endotrophic Mycorhiza of the Horse-Chestnut (*Aesculus* and *Pavia*)** (Mycorhyzes endotrophes du Maronnier d'Inde (*Aesculus* and *Pavia*) et leur signification). — *Bulletin de la Société Vaudoise des Sciences naturelles*, Vol. XXVII, N. 173, pp. XXV-XXVII. Lausanne, Juin 1911. 2284

Mr. Paul Jaccard, Professor of Botany at the Federal Polytechnic School of Zurich, communicates the following observations :

" The horse-chestnut does not seem to be so refractory to the formation of mycorhiza as was hitherto believed. In 1904, the writer, on examining carefully the root system of a horse-chestnut at the Garden of the School of Forestry at Zurich, found the lateral rootlets (*Kurzwurzel*) of this plant full of hyphae and transformed into typical endotrophic mycorhiza. Roots of *Aesculus* and *Pavia* (1) obtained from several stations (neighbourhood of Zurich, Wesen, Vitznau, Ticino) showed a certain number of infested specimens, side by side with others which were entirely immune. Switzerland

To determine the cause of this unequal distribution, horse-chestnuts were set in 1907; and some of the saplings were cultivated in several of the garden-beds, others were placed in the vicinity of wild trees. Some of the pots were open at the bottom so as to allow the main root to grow down into the garden soil. An examination made in March 1911, four years after they had been set showed that only those plants grown in pots, without direct communication with the soil, were infested; whilst the roots of those grown in the beds, and of those grown in pots open at the bottom showed no trace of hyphae. Owing to the small amount of soil available, the plants with mycorhiza, though quite healthy and normal, were small. Though the soil in the pots had been originally sterilised, and though on examination a year after, no hyphae were detected in the roots, the fungi present in the soil near by soon invaded it.

" Thus the formation of mycorhiza in horse chestnuts grown in pots would seem to be the result of the retarded development to which the plant is constrained. The less vigorous nutrition and growth of plants grown in a restricted space prevents them from offering the same degree of resistance to the fungi of the soil, which thus penetrate into the lateral rootlets and from thence doubtless into the cortical parenchyma of the main roots (*Triebwurzel*).

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(1) *Pavia* is not generally separated from *Aesculus:* it contains several North American species. See A. REHDER, in L. H. BAILEY'S, *Cyclopedia of American Horticulture* Vol. I, p. 31. New York and London, 1909. (*Ed.*).

" The results of these experiments therefore, lead to the conclusion that the penetration and development of hyphae in the root system of *Aesculus* and *Pavia*, especially in the short roots, is a phenomenon of characteristic parasitism, and not of symbiosis. In this case the parasitism is, indeed, almost harmless, being more of the nature of commensalism. The hyphae absorb the matter dissolved in the cell-sap, without making a direct attack on the cell plasm. The fungus feeds on a phloroglycoside which is present in all the living cells of cortical parenchyma, and which diminishes notably in quantity in the infested roots.

The endophyte, the specific nature of which has not yet been determined, is very similar in all its characters to other mycorhiza endophytes; it forms agglomerates and sporangia and accumulates reserves in large vesicles of a spherical or elliptical shape. The activity of the fungus ceases with the desiccation of the rootlets, which occurs without the intervention of the fungus; but seems to be accelerated by its presence, and by the exfoliation of the bark of the long roots, caused by the formation of a suberous pericyclic layer.

2285 E. G. ARZBERGER. **The Fungus Root Tubercles of *Ceanothus americanus, Elaeagnus argentea* and *Myrica cerifera*.** (*Missouri Bot. Gard. Ann. Rpt.* 21, 1910, pp. 60-102, pls. 9). — *E. S. R.*, Vol. XXIV, No. 6, p. 554. Washington, May, 1911.

United States: Missouri

After a brief historical review and summary of the work done by previous investigators on this subject, the writer reports a study of the external characters, internal structures, and the relationship of the fungus to the host, with respect to the tubercles on the roots of *Ceanothus*, *Elaeagnus*, and *Myrica*.

" For the tubercles on *Ceanothus* it was found that the infection of the roots was common and occurred through a root hair or an epidermal cell. Three distinct stages in the life cycle of the fungus were noted: viz. (1) the mycelial stage in the host cell; (2) the sporangia state, which initiates the conditions for the digestive cell; and (3) the last stage, where all but the walls of the mycelium are absorbed. The nucleus of the invaded host cell at first increases in volume and in the size of the nucleoli and in the amount of chromatin present; but later, following the vesicular stage, the cytoplasm and nucleus of the host cell are absorbed. The cell contents of the fungus then disappear and both the host cell and the fungus die. In the earlier stages of the tubercles, symbiosis is quite ap-

arent, while later the fungus is able to dissolve the cell wall of he host."

"In *Elaeagnus* the fungus mycelium is much narrower than in *eanothus;* it branches profusely and forms vesicles, the contents f which break up into several segments. The fungus is not entirely bsorbed by the digestive cell, nor are the cell walls of the host roken down by the fungus. Both the host cells and the fungus inally die.

"The tubercles and fungus of *Myrica* differ in many respects rom those of *Ceanothus* and *Elaeagnus*. No hypertrophy or symbiotic relationship exists as in the other two, and the fungus must e regarded as a parasite.

"The form, structure, and behaviour of the fungus indicate hat it belongs to the genus *Actinomyces*."

An extended bibliography is appended.

E. F. SMITH. **Crown-gall and Sarcoma**. — *U. S. Department of Agriculture. Bureau of Plant Industry. Circular* No. 85, pp. 4. Washington, June 20, 1911. **2286**

In Bulletin 213 of the Bureau of Plant Industry of the United States' Department of Agriculture, the writer pointed out resemblances in crown-gall of plants to malignant animal tumours and especially to sarcoma. Further studies have revealed that in method of development this disease is strikingly like that of certain malignant neoplasms in man, especially those in which a distinct strand of tumour tissue has been traced from the primary tumour to the secondary tumour. **United States**

The writer obtained much favourable material for study from inoculations made on the daisy (1), using for inoculation pure cultures of the Schizomycete from tumours on the daisy.

His investigations yielded the following results :

The Bacterium causing the primary tumour occurs also in the secondary tumours and in about the same numbers. It occurs also sparingly in the tissue between tumours.

In other words, there is not in this disease a cell stimulus begun in the primary tumours by a parasite, and then able to propagate itself independently of the inciting organism. On the con-

(1) In America the word daisy is applied to many field composites. Unqualified it is commonly understood to mean *Chrysanthemum Leucanthemum*. L. H. BAILEY, *Cyclop. of American Horticulture*, p. 453, New York, 1909. (*Ed.*).

trary, the Bacteria and the tumour cells occur together, both in the primary and in the secondary tumours, *and the one inside the other.*

In many instances (the writer cannot yet affirm that it is so in all) the secondary tumours are connected with the primary tumour by a deep-seated strand or pedicel of tumour tissue. This strand wedges its way through the interior of stems and leaves *after the manner of a foreign body,* until in some suitable place, often at a considerable distance from the primary tumour, it gives rise to a deep secondary tumour, which subsequently ruptures through to the surface of the plant. This offset from the primary tumour occurs deep in the wood, at the junction of wood and pith, and may sometimes be seen with the naked eye, owing to the fact that the chloroplasts in its cells become more numerous than elsewhere, and give the strand a deep-green colour. In cross sections of the stem, being under great pressure, it wells out ; at other times, the strand is restricted to a few cells and can be made out with difficulty even under the microscope. Frequently, in the course of its progress from the primary to the secondary tumour, the strand gives rise to island-like enlargements, which are the beginning of other tumours. Finally from this strand *Bacterium tumefaciens* has been cultivated out, and its cultures have reproduced the disease. Frequently the wood in this part of the stem takes on an increased growth.

When the primary tumour occurs on the stem, and secondary tumours appear in the leaves, the structure of the leaf tumours is approximately that of the stem. This stem structure may develop either in the central leaf trace, or in one or more of the side leaf traces, according as the one or the other is penetrated by the advancing strand of tumour tissue.

2287
Belgium

" Rêve d'Or " and " Ralliance ", Belgian Disease-Resistant Wheat Varieties. — See above; Abstract 2099 this *Bulletin*, July 1911.

2288

C. E. LEIGHTY. **Breeding Plants to Resist Disease.** — *American Agriculturist*, No. 25, pp. 3-4. Washington, June 24, 1911.

" It was early observed in the Southern States that not all cotton plants were equally attacked by wilt. In 1900 a planter,
United States
Mr Rivers, planted some seed from a resistant stalk of cotton, in a single row through a field in his ordinary cotton. The land was badly infested with wilt, and nearly all the cotton in the field

died, while not a plant in the select row was killed. This strain was planted on wilt-infected land the next year and resisted well. This variety now known as « Rivers », and two other varieties originated in the same way, have solved the problem of the wilt disease of Sea Island cotton.

The history of the « Iron » cowpea which is thoroughly resistant to wilt and root-knot is very similar to cotton. This variety arose as a probable mutation, and was found by chance. It proves to be resistant to these very destructive diseases, practically all over the South. What has been done with cotton and cowpeas is now being applied to Timothy. Dr N. J. Webber, who has done so much in breeding Timothy, has a variety that yields over 2 000 lbs of hay to the acre more than the ordinary unselected kind. This Timothy owes its high yield very largely to the fact that it is free from rust.

In North Dakota, Prof. N. L. Bolley has developed strains of flax so highly resistant to wilt that they grow well on badly infected land, where other strains will not grow at all, and where flax raising had been given up on account of the disease. By selecting healthy clover plants where all the other plants were killed, strains have been secured which grow, thrive and produce good yields of hay and seed where other plants could not live.

The single individual is the important thing and not the variety.

Plants inherit resisting qualities.

The « Iron » cowpea has been resistant since its discovery, more than 10 years ago. The resistant cotton strains selected out have remained so since they were first established.

Not only is disease resistance hereditary, but it can be transferred by hybridization and combined with other desirable qualities into new and better varieties.

No edible melon could be found which was resistant to wilt, but this quality was found in the « citron »(1), a related species. This, when crossed with the water-melon gave an intermediate form in the first generation. In the second generation, hundreds of forms appeared. From a 10-acre patch from this seed 10 melons were selected for further trial. Only one, however, has proved desirable. From this one, a variety has been originated which combines in a

(1) « Citron » is the name given to a variety of watermelon with very firm flesh, used for making preserves, like the true citron. L. H. BAILEY, *Cyclopedia of American Horticulture*, Vol. IV, p. 1968. London and New York, 1902. (*Ed*).

satisfactory way the edible qualities of the watermelon and the rust resistance of the citron.

It is believed that disease resistance is due to the presence in the plant of some chemical compound, an enzyme, which protects it from the disease. This substance is specific for certain diseases only, and does not afford protection against all.

Differences in soil and climate make of this breeding work a local problem. A variety excelling in one place may fail in another, and no one variety is going to be equally good everywhere ".

2289 T. HOLLIS. **Breeding of Asparagus Resistant to Rust.** — (*Report of the Massachusetts Asparagus Growers' Association*, 1910, p. 3). *E. S. R.*, Vol. XXIV, No. 6, p. 544. Washington, May 1911.

United States: Massachusetts

A brief progress report is given of the cultural experiments with asparagus being conducted at Concord, Mass., co-operatively by the Massachusetts Experiment Station, the U. S. Dept. of Agriculture, and the Massachusetts Asparagus Growers' Association.

One bed of asparagus set out in the spring of 1909 was cut profitably and without injury in the following season. This remarkable growth is attributed to thorough preparation of the soil and the use of roots from selected seed of plants having a carefully selected ancestry.

" The work of breeding asparagus resistant to rust, which is being conducted by J. B. Norton of the U. S. Department of Agriculture has progressed favourably. One variety, the New American, used as a male parent, has demonstrated prepotency beyond all others in the experiments. Although rust conditions were serious in 1910, all of the seedlings resulting from crosses between the above male parent and various female parents were in fairly vigorous condition. A number of these crosses shewed almost no rust; one entire division from one particular female grew well and showed no rust at all. It is hoped that from this latter mating and its progeny a rust-resistant strain will be secured ".

2290 V. VERMOREL and. E. DANTONY. **Sulphur easy to moisten.** — *C. R. de l'Acad. des Sciences*, T. 153, No. 3, p. 104. Paris, 17 Juillet 1911.

France

Following up previous researches, the writers have found that one can cause sulphur to be easily wetted by water by the simple addition of 1 % of soap.

Sulphur thus prepared, however, not being wetted by solutions of metallic salts or by the liquid acids of certain copper mixtures, Messrs Vermorel and Dantony have tried to obviate this difficulty, and their experiments have led them to this new formula:

Prepare a solution of:

Methylated Spirits . .	2 litres (0.44 gals)
Oleic acid (olein of commerce)	200 cubic centimetres (7 fluid ounces)

Mix this solution with 100 kgs. (220 lbs.) of sulphur. After evaporation or distillation of the alcohol, the sulphur thus treated preserves the property of being wetted by water and by acid, basic or neutral solutions of salts of the metals.

Sulphur simply impregnated with alcohol gets wetted by water; but it loses this property when the alcohol evaporates, whilst the addition of olein preserves it. If the alcohol be recovered, 100 kgs. of sulphur can be made capable of being moistened at a cost of only frs. 0.20 (2 *d*).

Parasitic Diseases of Various Plants and Means of Prevention and Control (1).

GEO. L. SUTTON. **"Take-all" in Wheat in Australia** (2). **Practical Methods for its Eradication and Control.** — *Agricultural Gazette of New South Wales*, Vol. XXII, Part 2, pp. 161-163. Sydney, February 2, 1911. **2291**

This disease is found to some extent in all the wheat districts of New South Wales, though it has not assumed here the same proportions as in some of the other States of the Commonwealth. **Australia: New South Wales**

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(1) The plants are arranged in the sane order as in the first part of this *Bulletin*. (*Ed.*).

(2) "Take-all" and "White-heads" in wheat. These names, according to McAlpine, are used in Australia to describe the serious inroads made by a fungus called *Ophiobolus graminis* (Sacc.) on the wheat crop during different stages of growth. The disease is equally well known in some parts of Europe, and is called "Maladie du pied", "Piétin du Blé", "Foot-rot", "Blackleg" etc. In England it is known as "Straw blight". The fungus occurs

"Take-all" can be recognised by portions of the crop becoming blighted or withered, the green plants turning greyish-white, and in some cases being entirely destroyed. The disease occurs in patches.

The practical way to eradicate the disease is to starve it by discontinuing wheat-growing for a period, supplemented by clean fallows; or by growing during the period of eradication only those crops, such as oats and rape, upon which the Take-all fungus can not live.

Burning the stubble helps to check its spread, but is unlikely to eradicate the disease.

Treating the seed, spraying the soil with fungicides, and turning the cultivated land out to pasture, have proved to be ineffective methods of checking the disease.

2292 H. B. DERR. **Diseases Affecting Barley.** (Barley: Growing the Crop). — *U. S. Dept. of Agriculture, Bull.* 443, pp. 42-44. Washington, June 12, 1911.

Barley is subject to a number of diseases, chief of which are the following: loose smut (*Ustilago nuda*) and covered smut (*U. hordei*). the first can be controlled by treating the seed with hot water (1), the second by a formalin treatment (2).

United States

Barley is subject to both leaf rust (*Puccinia simplex*) and stem rust (*Puccinia graminis hordei*). No absolute remedy is known. The selection of early maturing and rust-resistant varieties of barley and the use of well-drained land are recommended.

Ergot (*Claviceps purpurea*) is not common on barley, but is occasionally found in the Great Plains States.

Yellow-leaf disease of barley (*Helminthosporium graminum*) while not common in all parts of the United States, has caused consider-

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also on wild grasses; it has been met with on species of *Agropyron* in Italy and on *Bromus sterilis* in Australia.

Cugini has described a disease of wheat caused by *Ophiobolus herpotrichus* (Sacc.), which presents the same general appearance, and produces the same effects as those caused by *O. graminis*; this disease is confined to Italy. G. MASSEE, *Diseases of Cultivated Plants and Trees*, pp. 226-227. London, 1910.

Cf. this *Bulletin* Dec. 1910, p. 360. (*Ed.*).

(1) A detailed description of this hot water treatment is given in *Bulletin* 152, *Bureau of Plant Industry, U. S. Dept. of Agriculture*, 1909. See also, for description of the hot-water Jensen treatment of seeds and comparison with other treatments, ITALO GIGLIOLI, *Chimica Agraria*, Napoli, 1902, p. 463; and especially J. L. JENSEN, *The Propagation and Prevention of Smut in Oats and Barley*. Journ. Roy. Agric. Soc. of England, vol. XXIV, 1888, p. 397. (*Ed.*).

(2) For a more complete description of the formalin and other treatments for loose smut see *Farmer's Bulletin* 250.

able damage in certain portions. In Iowa it has been one of the most destructive of the parasitic diseases affecting barley. Attacks have also been noted in the Southern and Central States. No remedy is known.

Powdery mildew (*Erysiphe graminis*) sometimes occurs on this crop, but it is generally not severe enough to cause much damage.

Barley, like other grain crops, is attacked by a number of injurious insects. Among those which attack the growing crop is the spring grain-aphis or "green bug" (1) (*Toxoptera graminis*).

The Hessian fly (*Mayetiola destructor*) by preference attacks wheat, but it will also breed in barley, especially where this is sown earlier than wheat.

In some localities the chinch bug (2) (*Blissus leucopterus*) infests barley and causes considerable damage.

Among the injurious insects which attack stored grain are the Angoumois grain moth and the various grain beetles and weevils, and they can be effectively kept in check by fumigation with carbon disulphide or hydrocyanic-acid gas (3).

Potato Leaf-Curl (4) **and Black-Stripe of Tomatoes.** (***Macrosporium Solani* Cke.**). — *Board of Agriculture and Fisheries*, Leaflet No. 164, p. 4. London, April 1906, Revised June 1911. 2293

"Potato leaf curl" is widely diffused. In addition to Britain, it occurs on the Continent, and is rampant in the United States. It has also occurred on *Solanum Commersoni* grown at Kew. (The "Leaf-roll" disease of potatoes in Germany is distinct, and is considered a physiological disease, brought about by enzymes, whose action results in an excess of sugar in the organs affected). Great Britain

"Black-stripe of Tomatoes" was, until recently, considered to be caused by a fungus named *Macrosporium Tomato*, Cke. It has, however, recently been found that *M. Tomato* is identical with *M. Solani*, the difference in the appearance of the fungus on the two

(1) A full description of the spring grain-aphis, with suggestions for its control is given in *Circular* 63, *Bureau of Entomology, U. S. Dept. of Agriculture.*

(2) The chinch bug is discussed in *Circular* 113, *Bureau of Entomology, U. S. Dept. of Agriculture.*

(3) Full directions for fumigation with hydrocyanic-acid gas are given in *Circular* 112, *Bureau of Entomology, U. S. Dept. of Agriculture*, and for fumigation with carbon bisulphide *in Farmer's Bulletin* 145.

(4) See Abstr. 1910, in this *Bulletin* for June 1911. (*Ed.*).

plants respectively being due partly to the host, but more especially to the fact that, in the potato, the fungus behaves as a perennial, its mycelium hibernating in the tubers, and growing along with the vegetative portion of the plant. In the tomato, there is no hibernating mycelium; and the fungus behaves as an annual, more especially infecting the fruit as a wound-parasite, but sometimes also infecting the stem and leaves.

Potato leaf-curl. — In the case of the potato the haulm is more or less stunted, the foliage is small and the leaflets are much curled. In many instances, the shoots do not appear above ground, leaving gaps in the rows. The haulm is infected either by the hibernating mycelium passing directly from the tuber, or by means of spores present in the soil, which infect the young sprouts. In either case the arrest of growth and the curling of the leaves is due to the ascent of water and food being checked by the upward growth of the fungus mycelium in the tissues of the haulm. As the mycelium increases in quantity, the haulm becomes limp and collapses, owing to lack of water.

If a tuber contains no hibernating mycelium, the tubers it produces may become diseased, if the sprouts are infected while quite small, as the mycelium grows up along with the haulm, and passes into any tubers it may produce. Tubers which give origin to curled foliage do not decay, but remain firm and hard.

Experiments conducted at Kew, show that when a tuber known to contain hibernating mycelium is planted, and the foliage shows the characteristic curl, the tubers produced by such an infected tuber do not perpetuate the disease *if they are lifted some time before they have completed their growth.* This suggests that the mycelium only passes from the haulm into the tubers during the last stages of growth; and further suggests that tubers intended for "seed" should be lifted before they have completed their growth. This, perhaps, explains the comparative freedom from leaf-curl of Scotch "seed"; which, in the case of late or maincrop varieties, is invariably lifted in an immature condition.

It is also known that after having been grown for two or three years in the South of England, Scotch "seed" contracts leaf-curl, probably owing to the tubers being allowed to reach maturity before they are lifted, when they become infested with mycelium through infection of the sprouts as indicated above.

After the mycelium has passed up the haulm and into the leaves, the fungus breaks through the tissues and produces its fruit, in the form of numerous irregular, blackish, minutely velvety patches, scattered over the surface of the haulm and leaves.

Preventive Measures. — 1. Preventive measures will consist in not planting " sets " which were grown in an infected area ; where the disease has occurred, the haulms should be brought together and burned.

2. Tubers intended for " sets " should be lifted before they reach maturity. This appears to be the most practical method of combating the disease.

3. A dressing of kainit in the rows when the potatoes are planted would to a certain extent safeguard the crop, by killing spores present in the soil at the moment of germination.

4. Spraying is of no avail.

Black-Stripe of Tomatoes. — This disease is sometimes known as " Black Rot ". The fruit is most frequently attacked, discoloured patches appearing, which become slightly sunken owing to collapse of the tissues. Such patches soon become covered with a delicate velvety pile of a blackish-olive colour. The fungus sometimes forms long, blackish stripes on the stem, and irregularly shaped blotches on the leaves (1).

Preventive Measures. — 1. Cleanliness, as usual, is of primary importance. If all diseased material is promptly burned no spores can exist to start an epidemic. Infection can only take place through a wound. Minute cracks on the fruit in the neighbourhood of the style, exposing the fruit to infection, are often the result of overfeeding, more especially when green stable manure is used.

2. The fact must be kept in mind that the spores produced on the tomato plant may infect a potato plant, and *vice versa.*

I. B. Pole Evans. **Potato Scab (*Oospora scabies*).** — *Agric. Journ. of the Union of South Africa*, Vol. I, No. 5, pp. 692-693. Pretoria, June 1911. 2294

Potato scab is one of the commonest and most widely distributed fungous pests, against which the potato grower in South Africa has to contend.

Potato scab, however, can easily be prevented, if the proper precautions are taken. Recent experiments at the Leeds University show that the use of sawdust, at the rate of 5 000 lb. per acre, applied over the sets at planting time, greatly diminishes scab on land very subject to it. Diseased tubers can be completely sterilized by immersing them for 2 hours in a solution containing one pint of formalin to 30 gallons of water. South Afri

(1) On Black-Stripe of Tomato, see also: *The Science and Practice of Farming during 1910 in Great Britain*, p. 335. Intern. Inst. of Agric. Rome, 1910. (*Ed.*).

2295 F. C. STEWART, G. T. FRENCH and F. A. SIRRINE. **Potato Spraying Experiments in 1910.** — *New York Agr. Exp. Sta., Bull.* No. 338, pp. 115-151. Geneva, N. Y., May 1911.

This Bulletin gives the results of the ninth year's work in the ten-year series of potato spraying experiments, begun in 1902. During 1910, the experiments were conducted along the same lines as in previous years. Nineteen separate experiments are reported.

Ten-year Experiments. — At Geneva, 6 sprayings increased the potato yield 63 bushels per acre; and 3 sprayings increased it 22 bushels.

United States: New York

Flea beetles (1), early blight (*Alternaria Solani*), late blight (*Phytophthora infestans*) and rot (*Rhizopus nicrigans*) were all factors in the experiments. The benefit from spraying was scarcely noticeable until after September 2nd. At Riverhead, the gain due to 5 sprayings was 19 bush. per acre; and to 3 sprayings 8 ⅓ bushels.

The plants suffered from drought and were slightly injured by flea beetles, aphids and early blight, but there was no late blight or rot.

Farmers' Business Experiments. — In 12 farmers' business experiments, including 218 acres, the average gain due to spraying was 19.1 bush. per acre. The average total expense of spraying, 4.04 dollars per acre; and the average net profit, 4.39 dollars. In 3 of the experiments spraying was unprofitable.

Volunteer Experiments. — Five volunteer experimenters reported gains averaging 68 bush. per acre. Colorado beetles (*Lepinotarsa decemlineata*), flea beetles and tip burn (2) were the chief troubles of potato foliage in 1910. Early blight was not destructive.

The most striking event of the season was a late outbreak of late blight which caused very little injury to the foliage, but resulted in considerable loss from rot. This might have been prevented by late spraying.

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(1) Flea beetles, a family of small winged beetles which includes the well-known pests "Hop Flea" (*Haltica concinna*), the "Turnip Flea" (*Phyllotreta nemorum*), and the "Cabbage Flea" (*Haltica oleracea*). CECIL WARBURTON in: *A Standard Cyclopedia of Modern Agriculture*, edited by P. WRIGHT, Vol. VI, London 1910, p. 15). (*Ed.*).

(2) Tipburn. The leaves die at the tips and margins, blacken, roll up, and break off. The disease is widespread in the north-eastern United States, especially in dry, hot summer weather. It is not due to parasites. STEVENS and HALL, *Diseases of Economic Plants*, New York, 1910, p. 279. (*Ed.*).

White Rust of Sweet Potato in Montserrat. — *The Agricultural News*, Vol. X, No. 240, p. 222. Barbados, July 8, 1911. 2296

The Curator of the Botanic Station in Montserrat has recently sent for examination to the Imperial Department of Agriculture of the West Indies some specimens of leaves of the sweet potato, showing peculiar blisters. These blisters were irregular in shape, though usually roughly hemispherical, and were either concave or convex. They were studded with small, white, irregularly shaped pustules, occurring on both surfaces of the leaf, and varying in number according to the size of the blister. Some of the leaves also showed the presence of these pustules without the blister-like malformation. West Indies: Montserrat

These pustules were the fructifications of a species of *Cystopus*, probably *C. Ipomoeae-panduratae* (Schw.) Stev. and Sw. This fungus occurs on sweet potatoes in many parts of the world, including the United States and Brazil, and is also found on various other members of the Convolvulus family.

The fungus on sweet potatoes does not appear to cause any very serious damage.

Decortication of Sugar-Beet Seeds in the Control of "Root disease" (Wurzelbrand). — See Abstract 2123, this *Bulletin*, July, 1911. 2297 Hungary

***Melanconium Sacchari* attacking Sugar-Cane in the Hawaii Islands.** See Abstract 2357, this *Bullelin*, July, 1911. 2298 Hawaii

***Coffea arabica* and *C. liberica:* their Resistance to *Hemileia*, in Java.** — See Abstract 2130, this *Bulletin*, July, 1911. 2299 Java

P. Spaulding. ***Botrytis* as a Parasite of Chrysanthemums and Poinsettias.** — (*Missouri Bot. Gard. Ann. Rpt.*, 21 (1910) pp. 185-188, pl. 1), *E. S. R.* Vol. XXIV, No. 6, p. 555. Washington, May 1911. 2300

Attention is called to the attacks of this fungus (*B. vulgaris*) on flowers of chrysanthemums, on the lower leaves of poinsettias (*Euphorbia pulcherrima*) and of *Primula obconica grandiflora*, in the greenhouses of the Missouri Botanical Gardens at St. Louis. United States: Missouri

On chrysanthemums the disease first appeared as tiny, watery discoloured spots on the florets, looking as if they had been pricked with a needle. The diseased areas spread rapidly in size, until about one-fourth of the floret was affected, after which the diseased tissues wilted and dried up. Later the characteristic fruiting bodies of *B. vulgaris* appeared on the wilted florets.

On the poinsettias the fungus first attacked slightly projecting angles of the lower leaves of the plants, causing a small, deadened area at the very tips of the angles; while on the lower surface, extending along the larger veins, tiny white drops of the hardened latex could be seen. These small, hardened drops of juice seemed to be very characteristic of this disease upon the poinsettias. As the disease progressed, the affected areas became larger and the extreme tips of the affected angles withered and became discoloured. When about one-fourth of the leaf surface was involved, the leaf was prematurely shed, leaving, for badly diseased plants, a bare stem with a broad whorl of red leaves at the top. About two days after the leaves were first attacked, *Botrytis* spores were found in thick groups on the surface of the affected areas.

2301 **A Disease of Orchid Leaves.** *The Gardeners' Chronicle*, Vol. 4, No. 1281, p. 27. London, 15 July, 1911.

Great Britain: Cambridge

Considerable trouble has recently been caused in the Orchid house of the Cambridge Botanic Garden by the fungus *Hypodermium Orchidearum*: a parasite which was first described by Cooke and Massee, some years ago as the cause of a leaf spot of *Cymbidium eburneum*. At Cambridge this fungus has affected the leaves of several different kinds of Orchids, including species of *Thunia* and *Dendrobium*. The disease has usually begun to develop at the apex of the leaf, from which it spreads downwards, until a considerable portion of the leaf is killed. The affected parts become discoloured, and on these darks spots soon arise, from which chains of colourless spores are produced; the spores readily separate from one another at maturity. Tips of Orchid leaves often die from causes unconnected with the action of any particular organism; and from observations at Cambridge it appears that *Hypodermium Orchidearum* frequently begins to live as a saprophyte on such dead portions, subsequently invading living tissues, after the manner of so many other injurious fungi. This disease may be checked by sponging the leaves with a dilute solution of potassium permanganate.

F. CAVARA. **Bacteriosis of *Iris pallida* Lam. Preliminary note.** — (Bacteriosi del Giaggiolo (*Iris pallida* Lam.) Nota preliminare). — *Bollettino della Società botanica italiana*, No. 6, pp. 130-134. Firenze, Giugno, 1911. 2302

In some beds of *Iris pallida* Lam. at Pieve in Pitiana (Florence) an unusual yellowing of the leaves was noted last spring; they finally faded and rotted to the base. The rhizomes also rotted. Italy: Tuscany

A study of material collected on the spot where the disease broke out, led the writer to the conclusion that the disease was due to the presence of Schizomycetes; a conclusion which was confirmed by the cultures obtained from the rotten tissue taken from the diseased plants.

Innumerable colonies were obtained from these artificial cultures, in the shape of circular hyaline areola, which liquefied gelatine; and also, though in smaller numbers, colonies of an irridescent hue, much swollen and which did not liquefy gelatine. The scarcity of these latter colonies led the writer to attribute them to the presence of stray schizomycetes, unconnected with the infection, and only the first-mentioned cultures were used for experiments in inoculation. These inoculations never succeeded in producing the disease in the rhizomes, whilst in the leaves they were successful each time.

These experiments would seem to indicate that the development of the inoculated microorganism is hindered during the hot, dry season, and this conclusion is supported by observations made in the affected locality. The writer thinks that, in this case rot is due to special circumstances, such as a fall of temperature in winter, causing the reserve starch to change into dextrine; or to excessive atmospheric moisture, favouring the development of the bacteria.

A similar rot had already been recorded on *Iris florentina* L. and *I. germanica* L., in the north of Europe, by C. I. I. Hall; this writer also attributed it to bacteria (*Pseudomonas Iridis*, *P. fluorescens-exitiosus*, *Bacillus omnivorus*), which he succeeded in isolating, considering them to be chance parasites.

Mr. Cavara has noted differences between these bacteria and the microorganism he has studied, differences which he purposes describing later on. But in view of the stability of the form he has found in different rhizomes, and of its behaviour during the several experiments in the artificial inoculation of healthy plants, he is of opinion that, in the case he has studied, the infection is specific, certainly favoured by the special conditions of the envi-

ronment; and even by the method of cultivating the Iris, which exposes the rhizomes to infection.

2303 **Rose Canker and a new Apple Canker.** — *The Gardeners' Chronicle*, Vol. L., No. 1283, p. 71. London, 29 July, 1911.

In the issue of *The Gardeners' Chronicle* for May 13, p. 293, reference was made to the prevalence in England of Canker in roses caused by *Coniothyrium Fuckellii*. In the June number of *Phytopathology*, Mr. P. O' Gara records the presence of this disease in the United States and shows also that the same fungus is responsible for a canker of apple twigs in that country. The spore bodies and spores formed in the cankers of the apple are identical with those present in the rose canker; and cross inoculations have clearly established the identity of the two diseases. This canker of the apple affects the twigs and the stems of nursery stock, just above the crown. The same fungus causes a rot of the fruit, circular, discoloured, and somewhat sunken areas being formed at the points of infection. Mr. O' Gara mentions a case in which serious affection of young Apple trees occurred in the immediate vicinity of a clump of wild roses that were badly attacked by the same disease.

Great Britain. United States

2304 **Tomato "Black Stripe".** — See Abstract 2293, this *Bulletin*, July 1911.

2305 S. S. ROGERS. **The Late Blight of Celery in California.** — *California Sta. Bull.* 208, pp. 83-115, pl. 1, figs. 18; *E. S. R*, Vol. XXIV, No. 6, p. 551. Washington, May, 1911.

This paper covers the work done on this disease (*Septoria petroselini-apii*) by the California Station during the past four years, including the observations and results of experiments conducted in the celery fields of Orange County during the season of 1909 and the spring of 1910.

United States: California

After a brief description of the methods used in growing celery, the author gives the history, distribution and appearance of the fungus, together with the methods used for its control. As a result of investigations it is recommended that a 5 : 6 : 50 Bordeaux mixture be used at the rate of 30 to 40 gal. per acre, when the

plants are small, the amount to be increased as the plants grow until not less than 100 gal. per acre is used on plants 15 or more inches tall. The seedlings should be sprayed at least twice, and again not later than 6 weeks after transplanting into the field, or earlier if blight is noticed. Spraying should then be done once a month, until the seasonal rains or heavy fogs come; thereafter, every two weeks until the crop is harvested. Where the plants are over 15 in. tall, they should be gone over twice at each spraying, the machine moving in an opposite direction the second time. Demonstration plats sprayed according to these directions were almost entirely free from blight, while all checks not sprayed at all were practically ruined.

Brief notes are also appended on other fungus diseases and insect pests of celery (1).

The Fungus causing Pine-Apple Disease, *Thielaviopsis paradoxa*. 2306
— *The Agricultural News*, Vol. X, No. 234, p. 126. Barbados, 15 April, 1911.

Recent publications dealing with *Thielaviopsis paradoxa* are as follows: *Bulletin* 10 *of the Experiment Station of the Hawaiian Sugar Planters' Association* (2) which treats of the effect of the fungus on pineapples; *Bull. No.* 171 *of the Bureau of Plant Industry of the U. S. Dept. of Agriculture*, which treats of the effect of fumigation with formaldehyde vapour in killing the spores of the fungus; *Circulars and Agricultural Journal of the Royal Botanic Gardens, Ceylon*, Vol. IV, No. 22 and *Annals of the Royal Botanic Gardens, Peradeniya*, Vol. IV, p. 511, by Petch, which deal with the effect of the fungus on cocoanuts, and with various other points: such as its life-history and the action of various poisonous substances in preventing the germination of its spores, or in causing their death. **Hawaii. Ceylon. West Indies**

Massee, in investigating the life-history of the so-called rind fungus of the sugar cane (*Trichosphaeria sacchari*), found forms of spores which appeared identical with the spores produced by the pineapple disease fungus (*Thielaviopsis paradoxa*); and in consequence he put forward the theory that these two fungi were in reality identical.

This view was long held in the West Indies, but the balance of recent evidence is certainly opposed to it.

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(1) On Leaf disease of Celery, see *The Science and Practice of Farming during* 1910 *in Great Britain*, p. 301, Intern. Inst. of Agric. Rome, 1910.

(2) See Abstr. 1292 of this *Bulletin* for April 1911. (*Ed.*)

Three diseases of pine-apples are known to be due to this fungus in Hawaii: namely, fruit rot, or soft rot of the fruit, base rot of cuttings and leaf spot.

In addition to the plants already mentioned, the fungus can live upon ripe mangoes and bananas.

2307 United States

A new Apple Canker in the United States. — See Abstract 2303. this *Bulletin*, July, 1911.

2308

E. M. Doidge. **Leaf Blight of the Pear and Quince *(Entomosporium maculatum).*** — *Agric. Journ. of the Union of South Africa.* Vol. 1, No. 5, pp. 694-695. Pretoria, June, 1911.

The disease known as « leaf blight » or « scald » is one which is very prevalent in South Africa. It causes here considerable damage to young pear trees, but it is especially prevalent on quince trees.

Union of S. Africa

In addition to the pear and quince, « leaf blight » is capable of attacking apple, peach, cherry and other rosaceous trees. In Europe the disease has been known for nearly a century and has been reported from Germany, Sweden, Italy, and France. It is widely distributed in America. Some years back « leaf blight » was mentioned as causing considerable damage to pear trees in Natal.

Badly infected trees are readily distinguished by their defoliated appearance and by the numerous dark blotches on the remaining leaves and fruit. After the more or less complete defoliation, not infrequentiy a second growth of leaves is produced and these suffer in the same way. This repeated defoliation much weakens the trees and interferes seriously with the growth of the wood and the maturing of the fruit.

« Leaf blight » can be completely held in check by spraying. The trees should be thoroughly sprayed, before the buds begin to swell, with Bordeaux mixture (5 lb. copper sulphate, 5 lb. quicklime 45 gals. water).

When the leaves are about two-thirds grown, a second application should be made, this time using a more dilute solution (4 lb. copper sulphate, 4 lb. quickline, 100 gals. water). Diseased leaves and branches should be removed and burnt.

I. B. POLE EVANS. **"Peach Freckle", or "Black Spot"** ***(Cladosporium carpophilum* Thüm**). — *Agric. Journ. of the Union of South Africa*, Vol. I, No. 5, p. 696. Pretoria, June, 1911. 2309

The fungus *Cladosporium carpophilum* was first described in 1877, in which year it was found causing considerable damage to peaches at Klosterneuburg, near Vienna, in Austria. Some twelve years later it was to be found in nearly all the peach-growing districts of the United States. To-day it is frequent on peaches throughout South Africa. Apart from peaches, the disease may affect the apricot, almond, nectarine, cherry, and plum. **Union of S. Africa. Austria. United States**

It first appears in the form of small, round, and dark green spots, usually at the stalk end of the fruit. These spots quickly increase in numbers, and extend their range of growth towards the apical portion of the peach. They are nearly always much more abundant on one side of the fruit than the other; and the side most exposed to the sun is the worst affected as a rule. The spots usually coalesce and produce dark-coloured patches. The parts of the fruit attacked by the fungus become hardened and tough, and not infrequently the side affected shrivels considerably. If any further growth of the peach takes place after the skin has become hardened by the action of the fungus, a characteristic cracking of the fruit occurs; which greatly impairs its keeping capabilities, in that it renders it an easy prey to decay fungi (1).

The most effective treatment for this disease is winter spraying with Bordeaux mixture (5 lb. copper sulphate, 5 lb. lime, and 45 gals. water). Two more sprayings (4 lb. copper sulphate, 4 lb. lime and 100 gals. water) will probably be found necessary to give the best results. The spraying should be carried out just after the fruit has set, and again when it is about half-grown (2).

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(1) The disease develops in most serious form during rainy seasons, and is worse upon some varieties of peaches than upon others. It is especially bad upon Hill's Chili. It is reported from Missouri to have done damage equal to 70 per cent of the value of the crop, and Selby estimates the loss in one crop in Ohio at from 20 to 50 per cent. (STEVENS and HALL, *Diseases of Economic Plants*, p. 125. New York, 1910). (*Ed.*).

(2) The self boiled lime-sulphur treatment has beneficial effects in controlling this disease. (STEVENS and HALL, *ibid.*, p. 126).

Compare with treatment for Shot-hole Fungus (*Cercospora circumscripta*) in the Peach tree: *The Science and Practica* of *Farming during* 1910 *in Great Britain*, p. 362. Intern. Inst. of Agric. Rome, 1910. (*Ed.*).

2310 N. Caledonia

New Caledonia Cocoa-nut Palms exempt from "Bud-rot". — See Abstract 2163, this *Bulletin*, July, 1911.

2311

H. D. HOUSE. **Heart Rot of *Quercus nigra*.** *Mycologia*, Vol. III, No. 4, p. 205. Lancaster, Pa., July, 1911.

United States: N. Carolina

Pyropolyporus Calkinsii, a large ungulate species found on living trunks of live-oak in Southern Florida, was recently collected by the writer on a living trunk of *Quercus nigra* at Lake Catherine, Onslow County, eastern North Carolina. The species doubtless causes heart-rot, after the manner of *P. igniarius*.

2312

P. BACCARINI. **Rot of Scarlet Maple (*Acer rubrum* L.) produced by *Daedalea unicolor* (Bull.) Fr.** (Sulla carie dell'*Acer rubrum* L. prodotta dalla *Daedalea unicolor* (Bull.) Fr.) — *Bollettino della Società botanica italiana*, No. 6, pp. 100-104. Firenze, Giugno 1911.

Italy: Tuscany

For some years past the writer has noted on a fine specimen of *Acer rubrum* in the botanical gardens at Florence the presence of fructifications of *Daedalea unicolor* (Bull.) Fr., a polyporus frequently found on forest trees and more especially on hornbeam, beech, oak, and horsechestnut.

The writer ascribes the progressive withering of the tree and the gradual decline of its foliage to this fungus, which is generally believed to be a saprophyte. He believes that the pathological process caused in the tree by *Daedalea* consists in a special decay of the wood; which is transformed into a whitish, fibrous mass which breaks and disintegrates on the slightest occasion.

The writer remarks that whilst *Daedalea unicolor* must be classed as a parasitic fungus, in as much as it grows on living plants, which it impoverishes, it does not possess the faculty of spreading, characteristic of the species most dreaded by growers of trees.

This fungus is probably a wound-parasite; and in view of the feeble reaction opposed by the tree to its activity, when it attacks one of the main branches, it finds in the woody tissue a means of spreading from top to bottom, gradually penetrating into the more important boughs and then into the trunk, thus causing a gradual decline of the foliage, due to the stoppage and gradual destruction of the vascular system, finally causing the death of the tree.

Root Disease of Castilloa and other Plants. — *The Agricultural News*, Vol. X, No. 240, p. 222. Barbados, July 8, 1911. 2313

Recently, the *Imperial Department of Agriculture of the West Indies* has received from Grenada young Castilloa trees, which had died from the effects of a root fungus.

This formed hard, brownish-black masses of a stromatal nature on the surface of the bark, and black streaks running into the wood, which was also turned grey in colour. The bark and cambium of the main root were completely destroyed as far as the ground level. Windward Islands Grenada

This fungus had many points in common with that causing root disease of cacao, though the fan-shaped masses of mycelium between the wood and the bark which characterize the latter were not present in this instance. There were also many points of resemblance between the fungus found on Castilloa and that on arrowroot in St. Vincent. Two other fungi were found on some of the specimens.

One was a *Nectria*, probably *N. vulgaris;* the other a species of *Lasiodiplodia*, almost certainly *L. Theobromae.* In addition, numerous shot borers, probably *Tomicus* sp., were present. The beetles probably only attacked the wood after its death; they were not sufficiently numerous to have caused the diseased condition.

The full list of plants at present suspected of being susceptible to the attack of the same (undetermined) fungus is: cacao, limes, orange, Castilloa, nutmegs, mangoes, avocado pear, bread fruit, bread nut (*Brosimum Alicastrum*), pomme rose, poix doux, immortel, pigeon pea and coffee; while, if it is the same as that on arrow root, several other plants will have to be added to this list.

Phanerogamous Parasites and Weeds.

Their Control.

2314 R. SEEGER. **Transpiration of the Hemiparasites of the Tribe Rhinantheae.** — *Nature*, Vol. 87, No. 2176, p. 54. London, July 13, 1911.

Austria

The writer's experiments, described in the *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften*, Wien (Vol. CXIX, Part IX), indicate that hemiparasites of the tribe *Rhinantheae* transpire much more freely than autotrophic plants. Thus *Euphrasia Rostkoviana* and *Odontites verna* gave off 19 milligrams of water in 10 minutes, as compared with 6 milligrams transpired by *Veronica Chamaedrys*, 1.8 by *Hydrangea hortensis*, and 0.48 by *Rhododendron hybridum* hemp.

2315 O. MUNERATI. **The Control of Noxious Weeds by means of their Natural Parasites** (1) (La lotta contro le piante infeste per mezzo dei loro parassiti naturali). — *Le Stazioni sperimentali agrarie italiane*, Vol. XLIV, Fasc. 3-4, pp. 165-178, tav. 1. Modena, 1911.

Italy

The writer notes in the first place that some noxious weeds enjoy almost complete immunity, whilst others may be attacked with more or less virulence either by animal or fungoid parasites.

For instance *Avena fatua* L., is refractory to all parasitic diseases; and *Sorghum halepense* Pers. enjoys an almost equal immunity. Parasites, however, frequently attack the following species: *Cnicus arvensis* Scop., *Sonchus oleraceus* L., *Vicia hirta* Balb., *V. segetalis* Thuill., *Lathyrus Aphaca* L., *Convolvulus sepium* L., *C. arvensis* L., *Papaver Rhoeas* L., *Silene inflata* L., *Leontodon hispidus* L., *Humulus Lupulus* L., *Sinapis arvensis* L., *Polygonum Persicaria* L., *Setaria italica* P. B., and *Orobanche* on bean and hemp.

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(1) See p. 169, *Bull.* Nov. 1910. (*Ed.*).

Mr. Munerati also notes that experiments made in different years with the seed of certain noxious weeds (*Vicia segetalis, Lathyrus Aphaca, Convolvulus sepium*) have shown that the germinating power of these seeds is greatly hindered when they are attacked by insect parasites, which riddle them.

In conclusion, the writer thinks that if the parasites of noxious weeds are to be encouraged, with a view to hindering their growth, practical success is best ensured by insect parasites.

G. D'Ippolito. **Effect of certain Chemical Substances on the Germination of the Seeds of *Cuscuta arvensis* Beyr. and *C. Trifolii* Bab.** (Azione di alcune sostanze chimiche sulla germinazione dei semi di *Cuscuta arvensis* Beyr. and *C. Trifolii* Bab.) (1). — *Le Stazioni sperimentali agrarie italiane*, Vol. XLIV, Fasc. 3-4, pp. 301-308. Modena, 1911. **2316**

The writer gives an account of some experiments made to test the effect of pure sodium nitrate, commercial nitrate of soda, nitrate of potash, nitrate of lime, nitrate of manganese, nitrate of ammonia, caustic soda, caustic potash, hydrated oxide of manganese, natural calciumcyanamide, calcium cyanamide after 12 days exposure to the air, and of formalin, on the seed of *Cuscuta arvensis* and *C. Trifolii*. **Italy : Emilia**

The experiments were made in the ordinary kaolin seed-boxes (173 sq. cm. in area) used in seed testing. They were made first in sterilised sand, and then in ordinary soil well broken up.

In the case of insoluble compounds (calciumcyanamide and oxide of manganese), the writer prepared 1 % mixtures with sand and with soil; then he placed the dodder seed in the seed-boxes (100 seeds for each experiment), covering them over with 200 gr. of sand thus treated, which he watered with 50 cc. of distilled water, in the case of the experiments made on sand, and with ordinary water in those made on ordinary soil.

In the case of soluble compounds, Mr. D'Ippolito prepared 1 % solutions with distilled or ordinary water as the case might be; and after covering the seed with 200 gr. of sand, or soil, he added 50 cc. of the solution in each experiment. Formalin (at 40 %) was diluted with water to 1 %.

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(1) See p. 169, *Bull.* Nov. 1910. (*Ed.*)

The seed thus treated was placed in a thermostat, where it was kept for nearly a month: at 28° C. for 10 hrs. and at 20° for the rest of the day.

The results obtained show first of all that germination was more active in the case of seed grown on sterilised sand than on ordinary soil.

The nitrates behaved in different ways : nitrate of manganese seemed to favour germination, whilst nitrate of ammonia clearly hindered it. Nitrate of soda did not have the same effect on the seed as it has on grown dodder plants, perhaps because of the husks which protect the former.

Oxide of manganese behaved much like nitrate, and also had a noticeably fertilising effect.

Calciumcyanamide displayed notable activity in the case of the experiments on pure sand, both when used pure and after exposure to the air. The 1 % solution of formalin displayed energetic activity in destroying the vitality of dodder seed.

Thus, nitrate of ammonia and formalin were found the most active of the substances experimented with. Nitrate of soda, applied in doses of more than 2 % may perhaps be added to them.

Moreover, by comparing the results obtained with nitrate of soda and nitrate of potash, with those obtained with their respective bases, which are preeminently caustic, it would seem that the injurious effect they have on dodder seed may be attributed to this caustic quality.

2317 O. W. BARRET. **A dangerous new Weed in the Philippines: Spread of *Lantana camara* in Negros.** — *The Philippine Agricultural Review*, Vol. IV, No. 2, pp. 82-83. Manila, February 1911 ; and *The Agricultural News*, Vol. X, No. 238, p. 189. Barbados, June 10, 1911.

Philippines. West Indies. Hawaii

The Plant *Lantana Camara*, which is one of those known as « wild sage » in the West Indies, has been introduced, together with other tropical American weeds and ornamental plants, into the island of Negros, in the Philippines. This plant, by its rapid spread and luxuriant growth, has already caused trouble to agriculturists in Hawaii, where insect pests have been introduced for the purpose of diminishing its spread.

It is best destroyed by cutting, just below the collar; and burning. The characteristic inflorescence of the plant consists of a small bunch of reddish or yellowish flowers, borne near the tips of the

branches; the flowers in the centre of the bunch open first, when their colour is pinkish or yellowish, but reddish or purplish after a few days. The most potent circumstance in the spread of the plant is the fact that the fruits are eagerly eaten by birds, which do not however digest the seeds.

The plant is a perennial, attaining in the West Indies a height of 5 to 7 feet. In Hawaii, it has been known to grow as tall as 15 feet; but the specimens in Negros were only 6 to 9 feet high, at the time of publication.

***Imperata arundinacea*, a Weed injurious to the Teak and Rubber Forests of the Dutch East Indies.** — See Abstract 2169, this *Bulletin*, July, 1911. 2318 Dutch E. Indies

G. T. French. **Spraying to eradicate Dandelions from Lawns.** — *New York Agr. Expt. Sta. Bul.* No. 335, pp. 35-43. Geneva, N. Y., March 1911. 2319

An experiment made at the New York Agricultural Experiment Station, Geneva, during the past two years, indicates that the spraying of lawns with a solution of iron sulphate, for the purpose of eradicating dandelions (*Taraxacum officinale*), is unlikely to be successful in New York. United States: New York

In 1909, a strip of lawn on the Station ground was sprayed six times between April 23 and September 24, with a solution containing 1.5 lbs. iron sulphate in each gallon (American) of water.

In 1910, the same strip was again sprayed six times, between April 15 and June 29, using 2 lbs. of iron sulphate per gallon. In both seasons the blooming of the dandelions was almost wholly prevented and many of the plants were killed outright by the treatment. Yet, on an area of 1 000 sq. ft. there were 1 085 live dandelions in July, 1910, when the treatment had to be discontinued because of the danger of ruining the lawn. The failure of the treatment seemed to be due to the great vitality of the dandelion roots

Injurious Insects and other Invertebrates.

Their Biology and Control.

2320 E. Ernest Green. **Insect Pests in Ceylon.** (Entomological Notes). — *The Tropical Agriculturist*, Vol. XXXVI, No. 6, pp. 516-518. Colombo, June, 1911.

Pests of the Tea Plant. Tortrix has been prevalent upon many estates in the Dikoya, Watawala and Dolosbage Districts where it showed a very marked preference for tea of inferior jats.

Ceylon

An outbreak of « Fringed Nettlegrub » (*Natada nararia*) occurred on tea in the Wattegama district. This foe can best be checked by pruning the plant when the caterpillars have reached the cocoon-stage and burning the prunings and fallen leaves.

The Small Tussock-Caterpillar (*Orgyia postica*) has recently made its appearance on an estate near Ruanwella. It is a species which occurs spasmodically and usually originates on some other tree, spreading thence to the tea. This caterpillar is very subject to a parasite (a Tachinid Fly), which rapidly gains the upper hand and effectually checks its increase.

« Bagworms » (*Psyche* sp.) have been troublesome in parts of the Yatiyantota district.

They not only attack the foliage (both old and young) but do even greater damage by gnawing the bark of the tender shoots. Lead chromate is a good and safe remedy.

Contact poisons are of little use for killing biting insects, such as caterpillars and beetles, but may act as a deterrent; for this purpose, a heavy spray of Kerosene Emulsion, « Macdougall's Wash » or « Vermisapon » usually has the desired effect.

Various patent insecticides are excellent remedies and the choice resolves itself into a question of cost (1).

Pests of the Dadap (*Erythrina*). Specimens of *Erythrina* stems, which were recently examined, proved to be literally smothered with a « mealy-bug » (*Dactylopius crotonis*), which, in its turn, wa

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Consult: H. Maxwell Lefroy, *Insecticides, Mixtures and Recipes for use against Insects in the Field, the Orchard, the Garden and the House.* Agriculiural Rescarch Institute Pusa, Bull.. N. 23, Calcutta 1911. (*Ed.*).

being attacked by the carnivorous caterpillars of a small butterfly (*Spalgis epius*), but with little effect.

In such cases, the stumps should be pruned back and sprayed with Kerosene Emulsion, « Vermisapon », « Macdougall's Wash » or « X e X Green ». Several larger insects of the « Stink-bug » family attack young shoots, wilting or even killing them. Among these may be mentioned *Anoplocnemis phaseanus* and *Cyclopelta siccifolia*. These insects are not of any great importance.

In addition to various insects of the bug tribe, the caterpillars of several species of moth feed on the leaves of *Erythrina*-viz « Death's Head » (*Acherontia lachesis*), *Tarragama dorsalis*, *Striglina scitaria*, and the larvae of *Agathodes ostentalis*. The caterpillars of *Terastia meticulosalis* tunnel into the pith of the young shoots.

Pest of Hibiscus. The « Hibiscus Weevil » (*Desmidophorus celatus*) occurs commonly upon Hibiscus hedges at certain times of the year, causing the wilting of the leaves and young shoots.

It is easily collected by shaking the branches on to a sheet spread on the ground.

Forestry, Entomological Research etc. in Hawaii. *Report of the Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii for the Biennial Period ending Dec. 31st, 1910. — Royal Bot. Gardens Kew: Bulletin of Miscellaneous Information.* No. 5, pp. 247-248. London, 1911. **2321**

Thïs report, containing 231 pages of letter-press and 45 pages of illustrations, deals with the main features of the work of the Department for the years 1909-1910, in its three divisions: Forestry, Entomology and Animal Industry. **Hawaii**

Forestry occupies upwards of 50 pages; and detailed accounts are given of the work of afforestation which is being carried on in the various islands in the territory.

Forestry in Hawaii is conducted with two principal objects in view: the creation and administration of forest reserves, and the extension of a forest cover over areas of waste or barren land.

For the first of these objects, forest reserves have been created about the head-waters of streams, the water-sheds and catchment areas, thus placing a limit on the cutting surface.

This was made necessary by the reduction of the natural water supply, consequent on the indiscriminate clearing of land for agricultural purposes. For this class of forest, Hawaiian trees

are relied on. Some of the chief are « Ohia Lehua » (*Metrosideros polymorpha*) « Koa » (*Acacia Koa*) « Mamane » (*Sophora chrysophylla*) and « Kukui » (*Aleurites triloba*).

The second class of forest, which is intended to supply the future timber requirements, is being established on land which is of little value for agricultural purpose. Much of it is under Government control ; but companies and private land owners are encouraged to plant, the experience of the officers of the Division being given when required. This class of forest is composed almost exclusively of exotic trees.

Eucalyptus robusta, *E. globulus* and *E. citriodora* are planted largely. Two coniferous trees which obtain favour are *Cupressus macrocarpa* and *Cryptomeria japonica*. Trees are distributed free from Government nurseries to small planters, and at a trifling cost to others, while on Arbor Day, they are given to all applicants.

The report of the Superintendent of the Division of Entomology records the steps taken to combat various insect pests which were harming melons, alligator pears, chrysanthemums, etc. (1).

Details concerning experiments made with various washes are recorded, and also the arrangements made for the inspection of imported plants and fruits. The vigilance of the several officers has been rewarded by their being able to exclude a number of serious insect and fungoid diseases.

The latter pages of the report are devoted to other things; detailed accounts are given of efforts which are being made to improve the breeds of cattle and horses in the territory, and the treatment and prevention of various diseases of animals.

2322 F. L. WASHBURN. **Cutworms, Army Worms and Grasshoppers - The Minnesota Grasshopper Law.** — *University of Minnesota. Agric. Expt. Sta. Bulletin*, No. 123, Division of Entomology, pp. 67-84. St. Paul, Minn., May, 1911.

United States: Minnesota

« Cutworms » are the larval forms of moths belonging to the family of *Noctuids* or Owlet Moths. This family is an enormous one. At least 235 different species of the group have been captured in this State. Of these, someting like 45 are typical cutworms.

They were extremely troublesome in Minnesota in 1910.

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(1) See Abstract 1943 of this *Bulletin*, June 1911. (*Ed.*).

Remedies. — On large acreages, fall-ploughing and thorough cultivation afford perhaps the most practical treatment.

A bait made of bran mash sweetened with cheap sugar or molasses, and made decidedly green with Paris Green, is a very good remedy in a garden.

Army Worms include the Wheat Head Army Worm (*Heliophila diffusa*, Walk) and the Army Worm, commonly so-called, *H. unipunctata*. The former is widely distributed over the United States as far west as the Great Plains; but it is not a frequent visitor in Minnesota, though it caused damage there in 1910.

In every case examined, it was found that the pest had its origin in old Timothy fields, which had not been ploughed for four years or more. After the Timothy heads were eaten, the worms turned their attention to oats, wheat or corn, travelling from one field to another—hence their name.

Preventive Measures and Remedies. — Fall ploughing and the rotation of crops are most efficacious. In cases of serious infestation one or two deep furrows should be ploughed across the line of march of the worms; the latter collect in the furrow and can be killed with kerosene or crude oil.

Another remedy is to spray a broad strip about the worms, or across their line of march, with Paris green, in the proportion of two or three lbs. in 100 gall. of water; or better, four or five lbs of arsenate of lead in 100 gall (454 l.) of water. Sometimes, the pests can be crushed by means of a heavy roller.

Mr R. L. Webster, of Iowa, advises early fall pasturing, allowing the stock to eat down infested fields between Sept. 1st and 15th. Also, when practicable, early fall ploughing (during the two first weeks in Sept.), by which the young larvae of the second generation are turned under and killed.

Grasshoppers. — During the summer of 1910, the grasshoppers worked more havoc than for years before. The best remedy is deep ploughing (five or six inches) in the late fall or early spring; or, if this is impossible, thorough harrowing, which breaks up the egg masses and exposes the eggs to the weather.

A poisonous bait, Criddle mixture, the burning of the young grasshoppers, poisoned bran (2 parts Paris green to 25 parts bran), « hopperdozers », and ploughing a strip to check the advance of the enemy, are, remedies which have been recommended. Criddle mixture consists of 1 part Paris green, about 100 parts horse-manure, by measure, and a little water; this is scattered on the field.

The Minnesota Grasshopper Law. — This is strikingly ineffective in comparison with that in force in N. Dakota. In Minnesota, complaint of the infested land is made in the fall, and specimens of eggs are sent to the State Entomologist or the Board of County Commissioners. If the conditions justify it, the entomologist recommends that the land should be ploughed, and a notice is served on the owner or lessee of the infected land to plough within a certain time. If he fails to do this, the county ploughs the land; and if he derives any benefit by raising crops immediately after, the owner has to refund the money expended.

In N. Dakota, however, the expense of ploughing is made a lien upon the land, and the record owner or incumbrancer must pay the cost of the ploughing.

2323 F. H. CHITTENDEN, **The Siamese Grain Beetle (*Lophocateres pusillus* Klug) in Texas.** — *U. S. Depart. of Agric., Bur. of Ent Bull.*, 96, Part I, pp. 18 (14-15). Washington, March 25, 1911.

The " Siamese Grain Beetle " has been observed in the U. S. upon rice and other cereals coming from Siam, Liberia, Ceylon, Blanco, Peru, El Rancho, Guatemala, India.

United States: Texas

In 1909, the beetle was found in several districts in Texas.

There is now practically no doubt that the species is fairly established both in N. and in S. America and tbat it is cosmopolitan, in a somewhat narrow sense, being apparently restricted to the warmer temperate zones.

Experiments show that the beetle will breed in stored grain; there is no evidence of its possessing predaceous habits.

There is a description of *Lophocateres pusillus* and a short bibliography.

2324 FREDHOLM. **The Mole Cricket in Trinidad.** — *The Agric. News*, Vol. X, No. 233, p. 106. Barbados, April 1st, 1911.

Three species of mole cricket are known in the West Indies, *Scapteriscus didactylus*, *S. variegatus*, and *Gryllotalpa hexadactyla*.

Trinidad

The amount of damage caused by the mole-cricket in Trinidad, amounts to about $ 15 000 (77 000 fr.) per annum; this loss, coupled with the fact that the insect is difficult to control, renders it a pest of importance.

It lives underground, in galleries which it tunnels for itself, during the whole of its life-time.

Its food is largely the underground portions of plants; and when small plants are cut off near the surface and fall within reach of the insect, the leaves and tender stems are also eaten.

Mole-crickets have several natural enemies in Trinidad, the most important of these being insectivorous birds, the savannah blackbird (*Quiscalus crassirostris*), the tickbird (*Crotophaga ani*) and the " qu'est ce qu'il dit " (*Lanius pitanga*). Fowls search diligently for the insects and eat them with avidity, as do also ground lizards and toads.

In protecting small areas, little difficulty is experienced. The soil should be throughly turned up before planting, thus exposing the insects to their natural enemies; and a trench of about one foot wide should be dug round plots of this kind.

Poisoned baits, strong soap solutions and light traps have been found useful; but the most economical and effectual method to pursue is the protection of the mole crickets' natural enemies, especially birds.

L. TRABUT. ***Aspidiotus britannicus* Newst, a Species of *Aspidiotus*, New to Algeria and resembling *Chrysomphalus minor*.** — *Bull, agric. de l'Algérie et de la Tunisie*, 17e An., N. 11, pp. 297-298. Alger, 1er Juin 1911. 2325

The examination of a large number of plants supposed to be suffering from the attack of *Chrysomphalus minor*, led to the discovery of a fairly common scale insect, intermediate in appearance between *C. minor* and *Aspidiotus Hederae*. Algeria

The follicle is red, thin, and transparent; the skin of the larva which forms the umbilicus at the top is brilliant, as in the case of *Chrysomphalus*. This red scale insect is not like the *Chrysomphalus*, which is surrounded at this season by young larvae which have survived the winter forming numerous white spots.

The insect can only be distinguished by means of microscopic investigation. The paraphyses on the pygidium, which are characteristic of *Chryrsomphalus* are wanting, together with the two projecting combs.

The species has been determined by Mr Marchal as *Aspidiotus britannicus* Newst. It occurs frequently upon *Ruscus Hypoglossum*, *Chamaerops*, *Phoenix*, *Ficus*, *Buxus balearica*, and Ivy: in fact upon the same plants as *Aspidiotus Hederae* and *C. minor*.

A. britannicus was observed in 1898 for the first time in England; it also occurs in America and in France, having been observed in the Jardin des Plantes in Paris. It is found on Ficus trees at Hussein Dey, where, however, owing to parasitic attack, it does little harm.

2326 C. W. JEMMETT. **Insect Pests in Southern Nigeria.** — *The Agricultural News*, Vol. X No. 240, pp. 218-219, Barbados, July 8, 1911.

In the *First Annual Report of the Government Entomologist for Southern Nigeria*, Mr. Jemmett gives a summary of the chief insect pests and emphasises the need of an immense amount of entomological work in Southern Nigeria. A classification of insects, according to their economic importance, is given,, and notes on a few of the most important insects noticed in 1909.

S. Nigeria

In addition to the annual report, Mr. Jemmett has issued a preliminary one on the insects affecting maize, on those observed on cotton (*Calandra* spp.), and also on insects found on cacao in 1909.

Maize seems to be attacked by two kinds of insects: grain weevils (*Calandra granaria* and *C. oryzae*), and lepidopterous larvae. The latter would seem to be similar to the boll worm (*Heliothis obsoleta*) and the corn ear worm (*Laphygma frugiperda*) in their mode of attacking the maize. The caterpillars on maize tunnel into the stem and ripening ears of the plant, in enormous numbers, causing great loss to the farmers.

The grain weevils are pests of stored grain in many parts of the world; but in Southern Nigeria they are reported to be pests of corn in the fields. This is probably due to the practice of leaving the corn standing after it is ripe. The remedy suggested is to harvest the grain as soon as it is ready.

Cotton is attacked by many of the same pests as in the West Indies, the most serious being the boll worm (*Heliothis obsoleta*), the cotton stainer (*Dysdercus* spp.), and aphis. The best course seems to be the destruction of the old cotton plants, as soon as the crop has been reaped.

Cacao is attacked by borers and termites, which injure the wood of the stem and branches; and also by a moth and fruit fly, which attack the pods and cause a considerable amount of injury. Two species of scale insects are also its enemies.

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(1) See Abstr. 1975 of this *Bulletin*, for June, 1911. (*Ed*).

The collecting and burning of all old pods, the disposal of the shells from which the beans have been taken, and the removal of all dead wood and careful tarring of cuts, are the chief remedies recommended. The collecting of the borer beetles, as carried out in the West Indies, is also suggested.

Parthenocarpy, a Protection Against Insect Attack. See Abstract 2146, this *Bulletin*, July 1911. — 2327 Germany

The Resistance of the Vine "Rupestris du Lot" to Phylloxera. — See Abstract 2151, this *Bulletin*, July 1911. — 2328 Hungary

Entomophagous Fungi in the West Indies. — See Abstract 2281, this *Bulletin*, July 1911. — 2329 Antilles

Natural Foes of the Sorghum Midge (*Contarinia* (*Diplosis*) *sorghicola*, Coq.). — See Abstract 2348, this *Bullelin*, July 1911. — 2330 United States

Natural Enemies of Sugar-Cane Pests in Hawaii. See Abstract. 2357, this *Bulletin*, July 1911. — 2331 Hawaii

Natural Enemies oi the Colorado Potato Beetle and the Potato Stalk Weevil. — See Abstrct 2360, this *Bulletin*, July 1911. — 2332 United States

Epicauta* Larvae, Foes of *Schistocerca paranense — See Abstr. 2350, this *Bulletin*, July 1911. — 2333 Brazil

E. K. CARNES. **Introduction into California of *Aphycus Lounsburyi*.** — *California Cultivator*, Vol. XXXVI, No. 24, p. 709. Los Angeles, June 15th 1911. — 2334

Aphycus Lounsburyi, a hymenopterous parasite of the "Black Scale" (*Saissetia Oleae* Bern), was sent by the Government entomologist of the Union of South Africa to the State Insectary, California, where experiments were made to acclimatise it. — United States: California. South African Union

It possesses an advantage over *Scutellista cyanea*, which is also a foe of the "Black Scale", in that it attacks the latter in all its

stages, up to that of the egg; and consequently has a much wider range of activity, and can work inland, where there is a more even hatch of *Saissetia Oleae*.

2335 **Parasitism of the Black Scale in Antigua** (1). — *The Agricultural News*, Vol. X, No. 239, p. 202. Barbados, June 24, 1911.

Leeward Islands Antigua

In a recent examination of a large number of black scales (*Saissetia oleae*) on cotton in one field in Antigua, it was found that nearly every scale insect which had reached the egg-laying stage harboured a grub of a small hymenopterous parasite, *Zalophothrix mirum*. The infestation of cotton by black scale, in this particular field, was most remarkable. It was cotton which had yielded its full crop and should have been pulled up and destroyed some weeks previously. It may be that, as far as the black scale is concerned, considerable benefit might be derived from allowing this cotton to stand until the majority of the parasites had completed their development and had begun to escape. By this means the parasites would attack the black scale on the succeeding crop of cotton.

Zalophothrix mirum attacks only the older scales, that is the mature females, which are about to begin, or have already begun, egg-laying. The egg of *Zalophothrix* is deposited in the cavity under the body of the female scale insect; and the grub which hatches feeds for most of its life on the eggs, and probably also on the young, of the scale insect. The tissues of the adult scale are not attacked until the grub is fully grown, or nearly so.

2336 J. E. Brooks. **How the Grape Curculio is Protected from its Natural Enemies.** — *The Southern Fruit Grower*, Vol. XV. No. 7. pp. 210-211. Chattanooga, Tenn., July, 1911.

United States: Tennessee

The grape curculio furnishes a good example of what is known as "protective mimicry". Its two chief feeding places are the upper surface of the grape leaves and the stems of the fruit clusters. Its movements are so slight as to be almost imperceptible; and while engaged upon the grape leaf, its resemblance is so close in size shape and colour to the pellets of excrement dropped by the se-

(1) See also Abstr. 1967 of this *Bulletin* for June, 1911. (*Ed.*).

veral species of large eaterpillars which feed on vine foliage, that the difference can scarcely be detected.

Similarly, while feeding on the fruit stems and laying eggs, it is protected by its resemblance to the little dried-up grapes that adhere to the stems throughout the summer. It is to its power of mimicking the objects which surround it that it owes its escape from its enemies.

Insect enemies attack the egg, larva, pupa, and adult; and there is at least one species of egg parasite. A minute coleopterous larva, probably a Coccinellid, has been observed in a curculio egg; and also a rove-beetle, of the species *Philonthus brunneus* Grav., in the act of devouring a curculio larva. Other enemies are: the nymph of the common "stink-bugs", *Bracon mellitor* Say; *B. dorsata* Say, which lay their eggs in curculio larvae; and *Stiboscopus brooksi* Ashm, which oviposits in the cocoons.

Under similar conditions, it has been found that the Curculio has little preference for any particular variety of vine, all kinds being almost equally attacked; late in the season the percentage of punctures in tender grapes tends to become slightly greater than in the thicker skinned sorts.

The average life of the adult is about 384 days, its average life-cycle being about 420 days.

Insectivorous Birds of New South Wales. (1) — *Agricultural Gazette of New South Wales*, Vol. XXII, Pts. 3 and 4, pp. 206-217. Sydney: March and April; 1911. **2337**

The two parts of this series of articles here considered contain the following:

The Diamond Bird (*Pardalotes punctatus* Shaw); the Crested Shrike Tit (*Falcunculus frontatus* Latham); the Grey Shrike Thrush (*Collyrio-cincla harmonica* Latham); and the Dollar Bird or Australian Roller (*Eurystomus australis* Swainson). **Australia: N. S. Wales. Queensland. Victoria**

The Diamond Bird is chiefly to be found in the south-eastern portion of New South Wales. It is exclusively insectivorous, the bulk of its food seeming to be the scale insects found on leaves, and the saccharine exudations that they cause.

The Crested Shrike Tit is not very numerous anywhere; but it is a good friend to the farmer, as it consumes many beetles that other birds neglect.

(1) V. Abstr. 1571 of this *Bulletin* for May, 1911. (*Ed.*).

The Grey Shrike Thrush lives in Queensland, New South Wales, Victoria, and South Australia. All kinds of insects form its food, and even snails and young lizards.

The Dollar Bird is migratory and is common in New South Wales during the breeding season, October to March, chiefly on the North Coast, but often about the open forest country east and west of the Blue Mountains. Its food consists of beetles and other large insects.

2338 Trinidad

Mole - Crickets destroyed by Birds in Trinidad. See Abstract 2324, this *Bulletin*, July 1911.

2339

H. Astruc, A. Couvergne and J. Mahoux. **On the Adhesiveness of Arsenate of Lead Insecticides.** (Sur l'adhérance des bouillies insecticides à l'arséniate de plomb). — *C. R. de l'Acad. des Sciences*, T. 152, No. 26, pp.1 860-1862. Paris, 26 Juin 1911.

As the use of arsenate of lead as an insecticidal spray in vineyards has now become general, the writers have determined, at the Oenological Station of the Gard in France, the degree of adhesiveness of the new mixtures used by vine growers. They also made tests to dedermine the influence of age on these mixtures. Experiments were made on sheets of g[illegible] leaves, and bay-leaves, whilst waiting for the vine-leaves to grow.

France: Gard

The following conclusions were arrived at:

1) The adhesiveness of arsenate of lead is generally high, being as great on glass as on the epidermis of plants.

2) The age of the mixture seems to have no distinct connection with its adhesiveness to glass; it only slightly affect its adhesiveness to vine leaves.

Mixtures which are not more than 5 days old lose none of their adhesiveness to the vine; and when prepared for a longer time (from 10 to 12 days) they lose about one fourth of their adhesiveness.

3) The powdered product, crushed fine and diluted just before using, though it looks heavy and settles rapidly, possesses three quarters of the maximum degree of adhesiveness.

Hydrocyanic Acid Gas and the Whitefly *(Aleyrodes)* (1). — *The Rural Calijornian*, Vol. XXXV, No. 7. pp. 210-212. Los Angeles, July 1911. 2340

Fumigation experiments with hydrocyanic gas, carried on in Florida during the short dormant period, (Dec., Jan, and Feb.) when there were no winged insects, demonstrated the practicability of this method for the control of the white-fly. It was found that fumigation could safely begin at sundown; and that on cloudy days it was safe to fumigate at any time with untreated tents. The effect of wind is so great that fumigation is not recommended when there is more than a slight breeze. The moisture on the leaves, in the form of dew, does not reduce the efficacy of the gas, but possibly increases it (2). United States: Florida

MOREAU-BÉRILLION. **Remedies against *Crioceris asparagi* and *Platyparea poeciloptera*.** (Traitements divers contre les Criocères et la Mouche de l'Asperge) — *Bullettin de l'Assoc. agric. et vit. de la Marne.* II An., N. 7, pp. 123-126. Reims, 15 Juillet 1911. 2341

The following remedies are recommended for the control of *Crioceris asparagi* and *Platyparea poeciloptera*.

The adult insects should be dislodged from the stalks by shaking the latter into a funnel above a vessel containing water. Often 25 or 30 of the pests are found on the same stalk. France: Marne

To destroy the larvae spread canstic powders, such as powdered quicklime, ashes, or a mixture of gypsum and sulphur, on the ground; then shake the larvae down: the powder sticks to their slimy covering and dries it up, so that they die.

Mr. Zacharewicz has had good results by dusting the stalks with the following mixture, which should be made just before use:

Powdered lime	74 parts
Sublimated sulphur	25 »
Pyrethrum powder	1 »

The dusting should be done with a bellows, very early in the day; and should be repeated three times, allowing an interval of three days between the treatments.

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(1) See Abstract 2001 in this *Bulletin* June 1911. (*Ed.*).

(2) For recent experiments on these fumigations, see: B. H. WALDEN, *Fumigating Buildings with Hydrocyanic acid Gas.* XXXIII and XXXIV Annual Reports of the Connecticut Agricultural Esp. Station, Hertford, 1910, p. 365. (*Ed.*).

The following mixture (Dufour's formula) is also recommended but it is expensive:

Soft soap	3 kg.	(3 lbs.)
Pyrethrum powder	1.5 »	(1.5 lbs.)
Water	100 litres	(10 gall.)

In Yonne, the following liquid is used as a spray:

Tobacco juice	1 litre	(0.8 pint)
Soft soap	2.5 kg.	(2.5 lbs.)
Water	100 litres	(10 gall.)

The soap is dissolved in hot water, then the tobacco juice is added, stirring all the time.

The treatment must not be carried out in sunshine, for fear of burning the plants.

2342 A. DE VARENNE. **A Method for the Destruction of the Vine-Cochylis.** — *C. R. de l'Acad. des Sciences.*, T. 153 N. 3, pp. 195-196. Paris 17 Juillet 1911.

France: Burgundy

This year, Cochylis larvae have invaded the vineyards of the greater part of Burgundy. At the end of July, they will give rise to a new generation, which will be far more numerous than that which appeared in the spring. A very efficient remedy against these pests is a mixture of ordinary benzine and poppy-seed oil, in the proportion of 4 to 1. The liquid can be thoroughly mixed by means of a drop-glass, or drop-bottle.

One or two drops are placed upon the small webs enclosing the larvae, which are killed in a few seconds. The treatment docs no harm to the grapes. Benzine has a weaker surface tension than the oil, so that it acts as carrier of the oil, enabling it to penetrate into parts of the bunch which it would otherwise not reach.

For the sake of economy, mineral oil can be used in place of benzine: in the proportion of 4 parts of mineral oil to one part of poppy-seed oil.

This method, though it appears complicated, is much simpler than hand-picking, or removing the larvae by means of forceps or a lace-hook, as is at present done by the vine-dressers, greatly to the detriment of the grapes.

About 10 ares 70 centiares (42 ½ rods) can be treated by one man in the day, the cost being 10 fr. per hectare (3 *s* 3 *d* per acre).

X. Y. Z. **Phenate of Nicotine, a Remedy against Cochylis, Caterpillars and other Insects.** — *La Petite Revue agric. et hort*, 17e An. N. 398, p. 147. Antibes, 9 Juillet 1911. 2343

In order to obtain the full effect of nicotine, whether of standard strength or not, against *Cochylis* grubs and to prevent it evaporating in the sun, or being washed off by dew from the vine, or other plants which have been treated, means must be taken to render the nicctine less volatile and to free it from substances which lessen its efficacy. This is done by using phenate of nicotine, a patented compound. France

This salt, which is formed by the combination of nicotine, in the free state, with phenol, is much less volatile than those salts which have hitherto been used, and surpasses its components as an insecticide. It is, in fact, the product of the union of two equally active substances, of which one is the complement of the other. Phenate of nicotine can safely be used in strong doses; it destroys not only the vine *Eudemis* and *Cochylin*, but also the scale-insects which attack fruit-trees and the more delicate green-house plants. This remedy has the great advantage of not staining on flowers or fruit. The amount used varies from 1 to 3 litres per 100 litres of water, according to the powers of resistance of the insects to be destroyed. For *Cochylis* and *Eudemis* 1 is enough. Phenate of nicotine can also be added to Bordeaux mixture (1).

V. Vermorel. **Observations on Lamp-traps for the Cochylis Moth** (2). (La Cochylis et les Lampes-pièges, au point de vue de l'opportunité des traitements). — *Le Progrès agricole et viticole*, 32e An., No. 29, p. 70. Montpellier, 16 Juillet 1911. 2344

It is generally agreed that lamp-traps can catch a large number of Pyralid moths; but the results obtained with such lamps in the case of the *Cochylis* moth are less certain. France

The writer made some experiments on this point, and he first proposed to measure the radius of action of these lamps.

He placed at one end of a large closed room, 50 meters long, an acetylene lamp with its tray. Every evening *Cochylis* and *Eudemis* moths, bred in captivity, were liberated nearer and nearer to the lamp.

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(1) See Abstract 1538 *Bulletin* May 1911. (*Ed.*).
(2) See Abstract 1538, *Bull.* May 1911. (*Ed.*).

When not more than 25 meters (27 yards) from the lamp, the *Cochylis* fly to it and are drowned in the tray. The Eudemis moths seem unaffected by the light at that distance.

The writer also tried to determine the importance which the height at which the lamp is placed might have in the case of the vineyards of the Beaujolais. He placed at a distance of 25 meters in all direction low lamps (Lucina), alternating with high placed lamps (Medusa).

For two nights low lamps trapped more moths than the high lamps; but the contrary occured on the following night. The largest number caught was 188 by one lamp. Lamps buried so that the flame should be on a level with the soil captured no more moths than the others. It is evident that lamp-traps supply valuable indications as to the advisability of spraying the vines by indicating the number of moths of the summer brood.

Insects Injurious to Special Crops.

2345 **The Frit Fly *(Oscinis frit).*** — *Board of Agriculture and Fisheries-Leaflet,* No. 202, pp. 4. London, December 1907, Revised, June 1911.

The larvae of the *Oscinids* or *Chloropidae* — a group of tiny two-winged flies — are known to be very injurious to cereals and pasture grasses in Europe and America. The species *Oscinis frit* is one of the chief cereal pests in Europe, and there are Continental records of *Oscinid* attacks on oats, barley, wheat, rye, maize, and various grasses. The chief damage in Britain is to oats, although barley may also suffer.

Great Britain: England

The larvae or maggots of the fly do the harm by feeding in the heart of the young plants, or in the grain in the young ears, according to the time of the year; and the different broods of the

insect. Eelworm (*Heterodera Schachtii*) attack very often accompanies attack of the frit-fly maggots. (1)

Typically, three generations are possible in the year. The flies issue from the puparia in April-May, in July and in August-September.

Prevention and Remedy. The oats should be put in as early as possible so that the plants may make some progress before the issue of the April and May brood of flies. The flies choose for their egg-laying young tender parts; the grown plants are therefore made use of less willingly, and even if they are infested, they suffer less. Badly infested plants cannot be saved, and should be ploughed in deeply. In certain circumstances the planting of half an acre of oats as a trap, after an early harvest, may be of advantage. The trap plants should be ploughed in deeply, with the aid of a skim-coulter, before February; or the crop may first be cut and converted into silage, or chaffed and fed to stock, and the area subsequently deeply ploughed by February. In either case the enclosed brood would be destroyed (2).

Insects injurious to Barley. — See Abstract 2292, this *Bulletin*, July 1911. **2346 United States**

J. HERRY. **Inroads of Weevils on African Maize.** (Charançonnage du Mais Africain). — *L'Agriculture pratique des pays chauds*, 11e An., No. 100, pp. 55-57. Paris, Juillet 1911. **2347**

African maize, like that from other countries and more especially from Argentina, is a host-plant for numerous parasites.

Three of these are beetles: *Calandra Oryzae, C. granaria* and a pea-weevil; another which has been recently recorded, but which is unusual, is *Gelechia cerealella*. The most common parasite is *C. Oryzae*, which is thought to have originated in India, and which is extraordinarily hardy and prolific in tropical countries. As soon as the still tender maize grain enters the warehouse, the Calandra **France**

(1) See Abstr. 1941 in this *Bulletin*, June, 1911. (*Ed.*)

(2) Miss Ormerod observes: "Looking at the point that in Sweden and Bohemia respectively, the maggots of the summer brood of the Frit Fly have been found feeding in ears of Barley and amongst the grains in Oat-heads, it appears so far possible that infestation may be imported in chrysalis form amongst the grain, as to make it worth while to examine it; and if the little reddish-brown chrysalis-cases should be observed, to pickle the grain." ELEANOR A. ORMEROD, *A Manual of Injurious Insects with Methods of Prevention and Remedy*. 2d. Edition. London, 1890, p. 75. (*Ed.*)

which are there in thousands, bore into the grain on the side adhering to the stalk, laying there one or several eggs.

In the tropics the life-cycle lasts a minimum of 21 days. Each female lays an average of 250 eggs; it has been calculated that a pair of *Calandra* in the South of France can produce 6 000 eggs in 5 months. The first condition for their development is the warehousing of unripe and therefore very tender grain, which develops considerable heat in the warehouse; the second condition is ventilation, so that maize stored in sacks is much more subject to injury than that stored in heaps. The causes of infection are in the first place the storage in warehouses, the use of infected sacks, and the mixing of old grain with newly purchased and sound grain (1).

2348 W. HARPER DEAN. **The Sorghum Midge. *(Contarinia [Diplosis] sorghicola)*.** — *U. S. Dept. of Agric., Bureau of Entomology, Bul.* 85 Part IV (Revised) pp. 39-58. Washington, April 18, 1911.

The bulletin under review deals with: the history of the sorghum midge in America, distribution, investigations carried on in Louisiana and Texas during 1908 and 1909, host plants, life-history and habits, natural enemies, and remedial measures. Two plates and 11 text figures illustrate the paper.

United States: Louisiana, Texas

Sweet sorghum (*Sorghum saccharatum*), apart from its use in making molasses, ranks as one of the most important forage crops grown in the United States. This crop, however, is attacked by several destructive pests, such as various pathological diseases, the English sparrow (*Passer domesticus*), the moth *Nigetia sorghiella* and the "rice weevil" (*Calandra oryzae* L.); but the most destructive is *Contarinia sorghicola* Coq. In the majority of cases this midge is directly responsible for the damage to the seed.

The sorghum midge is not known to exist west of the one hundredth meridian, and its extreme southern point of distribution in the United States is Brownsville, Tex.

n addition to the many varieties of sweet sorghum, the sorghum midge is known to infest broomcorn, Kafir (*Sorghum vulgare*), Johnson grass (*Sorghum Halepense*) and milo. In one instance the writer reared a single adult from the common foxtail grass (*Setaria glauca*); the midge was also reared from the grass *Sieglingia seslerioides*.

(1) All causes which favour the spoiling of maize, when stored in a tender and unripe condition, are of interest from the point of view of the possible rise and spread of *pellagra*, the disease so harmful in countries where maize is largely used as food for man. (*Ed.*).

Natural Enemies. — Parasites. *Aprostocetus diplosidis* Crawf. and *Tetrastichus* sp., parasitize the midge.

Predaceous Enemies: The "Argentine ant" (*Irydomyrmex humilis*); the fly *Psilopodinus flaviceps*; a hummingbird, probably *Trochilus alexandri*.

The destruction of Johnson grass, clean harvesting, destroying heads of first crop and, in a small crop, bagging heads are advised as remedial measures.

F. H. CHITTENDEN. **A List of Insects affecting stored Cereals.** — U. S. *Dept of Agr, Bur. of Ent. Bul.* No. 96, Part I, pp. 18 (1-7). Washington, March 25, 1911. **2349**

Insects affecting stored Cereals and Cereal Products.

Cucujidae. — *Silvanus surinamensis* L. *S. bicornis* Er., *S. mercator* Fano., *Cathartus gemellatus* Duv., C. *advena* Waltl. *Laemophloeus minutus* Oliv., *L. ferrugineus* Steph., *L. alternans* Er., *Laemotmetus rhizophagoides* Walk. **United States**

Dermestidae. — *Altagenus piceus* Oliv., *Anthrenus verbasci* L., *Trogoderma tarsale* Melsh., T. *ornatum* Say., *Aethriostoma undulata* Motsch.

Other Clavicorns. — *Tenebroides mauritanicus* L., *Lophocateres pusillus* Klug., *Typhoca fumata* L., *Pharaxonota Kirschii* Reitt., *Carpophilus dimidiatus* Fab., C. *pallipennis* Say.

Bostrychidae. — *Dinoderus truncatus* Horn., *Rhizopertha dominica* Fab.

Ptinidae. — *Ptinus fur* L., *P. brunneus* Dufts., *Niptus hololeucus* Fald., *Gibbium psylloides* Czem., *Sitodrepa panicea* L., *Lasioderma sericorne* Fab., *Catorama punctulata* Lec., C. *zeae* Waterh.

Tenebrionidae. — *Tenebrio molitor* L., *T. obscurus* Fab., *T. tenebrioides* Beauv., *Tribolium confusum* Duv., *T. navale* Fab., *T. madens* Charps., *Gnathocerus cornutus* Fab., *Gnathocerus* (*Echocerus*) *maxillosus* Fab., *Caenocorse ratzeburgi* Wissm., *C. subdepressa* Woll., *Latheticus oryzae* Waterh., *Sitophagus solieri* Muls., *Alphitobius diaperinus* Panz., *A. piceus* Oliv., *Alphitophagus bifasciatus* Say.

Rhynchophora. — *Calandra granaria* L., *C. oryza* L., *Caulophilus latinasus* Say., *Brachytarsus alternatus* Say., *B. variegatus* Say., *Rhyncolus orzae* Gyll.

Tineina. — *Sitotroga cerealella* Oliv., *Tinea granella* L., *T. biseliella* Hum., T. *palescentella* Haw., *T. misella* Zell., *Batrachedra rileyi* Wals., *Acompsia pseudopretella* Stain.

Phycitidae. — *Plodia interpunctella* Hübn., *Ephestia Kuehniella* Zell., *E. cautella* Walk.; *E. ficulella* Barr., *E. elutella* Hübn., *Pyralis farinalis* L., *Melissoblaptes gularis* Zell.

Orthoptera. — *Blatta orientalis* L., *Blatella germanica* L., *Panchlora surinamensis* L.

Neuropteroid Insects (Thysanura, Isoptera, Corrodentia). — *Lepisma saccharina* L., *L. domestica* Pack., *Termes flavipes* Koll., *Troctes divinatoria* Fab., T. *corrodens* Heymons.

Acarina. — *Tyroglyphus farinae* De G., *T. siro* Gerv., *T. longior* Gerv., *T. americanus* Bks.

In Mr. Chittenden's list the following data are given for each species: synonymy, popular name, papers published by the *Bureau of Entomology of the United States Department of Agriculture*, the nature of the damages caused.

2350 ***Epicauta* spp. (" Vaquinhas "), injurious to Potatoes and Vegetables in Brasil. Means for their Control.** (As vaquinhas e sua destruiçâo). — *Evoluçâo agricola*, Num. XXIII, Anno II, pp. 9-14. Saô Paulo. Maio, 1911.

Serious damage is done in Brazil, more especially in the southern states, by different species of *Epicauta* (heteramerous Coleop-
Brazil tera of the Cantharid group) to almost all the *Solanaceae* and to cultivated and wild plants of other families. The Portuguese name of " Vaquinhas " is applied in Brazil to all these kinds.

The plants more particularly affected are potato, beetroot, tomato, spinach, capsicum, egg-plant, " gilo " (1) etc. In the State of Saô Paulo the fields of lucerne and *Melilotus alba* are also devastated.

The genus *Epicauta* comprises several noxious species: *E. adspera* Khig., which is perhaps the most widespread and common, *E. cinerea*, *E. atomaria* Germ.; *E. sulcrifrons; E. vittata* (of the United States); *E. purpureiceps* Berg, etc. The States of Saô Paulo, Rio Grande do Sul, and Minas Geraes seem to have the largest number of these species.

The larvae of *Epicauta*, both primary and secondary, feed on the eggs of the migratory grasshoppers (*Schistocerca paranense* Burm.). But the service they thus render is much less than the injury caused by the adults, which feed on the leaves on which they lodge.

As a remedial measure it is advisable to collect the adults, which fly with difficulty, and to spray and wash with insecticides, more especially with arsenical mixtures.

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(1) " Gilo del Brasil ", *Solanum Gilo* Paddi, an edible plant (MIGUEL COLMEIRO, *Diccionario de los diversos nombres vulgares de muchas plantas*, etc. p. 89, Madrid, 1871), (*Ed.*).

Flea Beetles and Colorado Beetles, injurious to the Potato. — See Abstract 2295 this *Bulletin*, July 1911. 2351 United States

F. M. WEBSTER. **The Alfalfa Weevil.** — *U. S. Dept. of Agr. Bur. of Ent. Circ.* No. 137. pp. 9. Washington, April 20, 1911. 2352

The Alfalfa Weevil (*Phytonomus murinus* Fab.) is not native to America, but has been accidentally introduced from Europe, Western Asia, or Northern Africa, where it is common; and where, while more or less destructive to alfalfa, it is probably prevented by its natural enemies from working serious and widespread ravages.

In the United States it was first discovered in 1904, near Salt Lake City, Utah. In the first four years following its discovery the alfalfa weevil has spread over a total area of fully 100 square miles of territory. United States

The beetles often push their eggs down between the leaves; but the usual place of oviposition, is by punctures made in the stem. Each puncture may contain as many as 30 eggs; and some plants have been found to contain upwards of a hundred punctures. At the beginning of the season some damage occurs on account of the beetles puncturing the young stems and killing them. The eggs hatch in about 10 days; the young caterpillars make their way to the leaves, first eating holes in them, thus preventing the growth of the plant. The larvae continue to attack the plants, being most abundant during May and gradually becoming less numerous throughout June. The adults not only feed upon the fresh growth but they also eat the bark from the stems, and thus, when very abundant, totally destroy the crop.

The Utah Agricultural Experiment Station during the season of 1910 carried out a great number of field experiments with different methods of controlling the weevil; but none of these has so far given entirely satisfactory results.

V. L. WILDERMUTH. **The Alfalfa Caterpillar (*Eurymus eurytheme* Boisd).** — *U. S. Dept. of Agric., Bureau of Entomology Circ.* No. 133. pp. 14. Washington. April 22, 1911. 2353

For some years past the caterpillars of *Eurymus eurytheme* (1) have been reported from various localities in the southwestern Uni- United States

(1) Closely related to the European Clouded Yellow butterflies (*Colia.* spp.), whose larvae also feed on clovers. (*Ed*)

ted States as in some cases doing a large amount of damage by feeding on growing alfalfa (*Medicago sativa*).

This species is much more abundant west of the Mississippi River than east of it, and it is rarely found east of the Allegheny Mountains. In the West it occurs from Mexico northward into the Dominion of Canada: thus covering the chief alfalfa growing section of the United States. It is especially abundant throughout the regions where irrigation is most extensively followed.

Besides alfalfa; the larva is known to feed upon *Trifolium reflectum, T. stoloniferum, T. repens, T. tridentatum* (but it is said not to attack *T. pratense*), *Astragalus caryocarpus. A. crotalariae. Melilotus alba* and *Medicago hispida.*

Insect Enemies. Euphorocera claripennis Macq. and *Masicera* sp. (Tachinid flies) and *Limnerium* sp. Hymenoptera) oviposit in the larva of *Eurymus,* whilst *Chalcis ovata* Say oviposits in the pupa. However, the most common natural enemy observed by the writer was a disease, presumably contagious, which attacks the larva. It sesms to be partly due to this disease that the alfalfa caterpillar does not appear in such large numbers in other regions of the Southwest, notably in alfalfa regions in Arizona.

The protective measures advised are as follows: The crop should be cut just as it is coming into bloom, which is a few days sooner than it is generally thought advisable to cut it. Thus the major portion of the larvae, finding a lack of the food necessary for their complete development, will ultimately perish. To bring about this condition, however, it is necessary to mow the field carefully, leaving no high stubble.

Pasture alfalfa whenever possible, as a minimum amount of damage occurs in such fields.

Renovate every winter, either by disking, or by the use of an alfalfa renovator.

2354
France

***Aphis papaveris* injurious to Sugar Beets.** — See Abstract 2273, this *Bulletin*, July 1911.

2355

Palm Pests Attacking Sugar-Cane. — *The Agricultural News*, Vol. X, No. 234, p. 122. Barbados, April 15, 1911.

British Guiana
Trinidad.
Surinam.

Dr. Lewis H. Gough has given an account of the "palm weevil," (*Rynchophorus palmarum*) attacking sugar-cane in Trinidad (1). *Castnia*

(1) See Abstr. 1977, of this *Bulletin* for June, 1911. (*Ed.*).

daedalus is a large day-flying moth, known as a pest of palms in South America, which has been reported to attack sugar-cane in British Guiana. The adult is about twice the size of *Castnia licus* (1), which has become such a pest of sugar-cane in British Guiana in recent years. In the *Agricultural News* (January 22, 1910 p. 26), *Castnia daedalus* is mentioned as occurring in Surinam as a pest of cocoa-nuts, and *C. licus* is noted as attacking cocoa-nut and other palms in Trinidad. It would appear that the transition from palms to sugar cane, and from sugar cane to palms, is not difficult for these insects.

The Root Borer of the Sugar Cane. *The Agricultural News*, Vol. X. No. 240, p. 218. Barbados, July 8, 1911. **2356**

The root-borer of the sugar-cane (*Diaprepes abbreviatus*), which appeared as a serious pest in a limited area in Barbados in 1909 and early in 1910, was again in evidence, causing serious injury to ripening sugar-cane during the first months of the present year.

In the *West Indian Bulletin*, vol. IV, p. 37, a paper was published, by N. B. Watson, on the root-borer of the sugar-cane, in which the life-history of this pest was given in detail. Mr. Watson observed that the adult weevils laid their eggs during August and September. This year, the weevils appeared earlier than the time given in previous records; perhaps on account of the unusual rains which fell during the early months. **Barbados**

The adult weevils hide among the leaves of maize and other plants, and mate in such situations.

In the laboratory, eggs were laid on June 27 and hatched within 6 days. Also in the laboratory, the eggs have been laid on leaves of Indian corn, imphee (*Holchus saccharatus*) and sweet potatoes; they are generally covered by a fold of the leaf, or by two leaves fastened together. The number of eggs in a cluster varies from very few to about 150; one female probably often lays more than 250, in several clusters at different times. The grub and pupa remain under ground nearly a year.

A crop of Indian corn might well be planted with a view to capturing the adults. Every effort should be made to discover the eggs, and to collect these as well as the weevils.

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(1) See Abstr. 353, of this *Bulletin* for Jan. 1911. (*Ed.*).

2357 D. L. VAN DINE. **Animals Injurious to Sugar-Cane** (1) **in Hawaii.** (The Sugar-cane Insects of Hawaii). — *U. S. Dept. of Agric., Bureau of Entomology, Bull.* No. 93, pp. 54. Washington, June 15, 1911.

The production of sugar is the leading industry in the Hawaiian Islands. Sugar cane is grown on four of the eight inhabitable islands: Hawaii, Oahu, Mani and Kanai.

There are more than 200 000 acres planted to cane in the islands. In 1908, 521 000 tons of raw sugar were produced, having a value of more than 40 000 000 dollars. The average yield of sugar per acre is 4 ½ tons.

Hawaii. Fiji.

The species of sugar-cane insects occurring in the Hawaiian cane-fields are as follows:

The "Sugar-Cane Leafhopper" (*Perkinsiella saccharicida* Kirk.) was introduced into the island some time prior to 1910 from Queensland, Australia.

The species occurs throughout the sugar-cane areas, both in Australia and in Hawaii, and has been recorded from Java (KIRKALDY, G. W. *A note on certain widely distributed Leafhoppers. Science,* Vol. 26, No. 659, p. 216, 1907).

In Hawaii, leafhopper injury is aggravated by the presence of the rind disease (*Melanconium sacchari*). The following species of natural enemies of *Perkinsiella saccharicida* are already present in the islands: *Coccinella repanda* Thunb., *Platyomus lividigaster* Muls., *Oechalia griseus* Burm., *Chrysopa microphya* McLachl., *Anomalochrysa* sp.; the spiders *Tetragnatha mandibulata* Walck., *Adrastidia nebulosa* Simon and several other species. Dr. Perkins (*Bd. Comrs. Agr. and Forestry, Hawaii, Div. Ent. Bull.* 1, pp. 20-23) mentions further a predaceous bug, *Zelus peregrinus* Kirk., and describes as new a hymenopterous parasite of the leafhopper under the name *Ecthrodelphax fairchildii* Perk.

Koebele and Perkins (PERKINS, R. C. L., *Leafhoppers and their natural enemies. Hawaiian Sugar Planters' Exp. Sta. Div. Ent. Bul.* 1, introduction, pp- III, IV, May, 1906) have found in Australia a considerable variety of Hymenopterous parasites of leaf-hoppers, of Dipterous parasites of the genus *Pipunculus*, and of Stylopid parasites of the genus *Elenchus*.

(1) See this *Bulletin* p. 379, Dec. 1910; Abstrs. 352 and 353, Jan. 1911; 678, Feb. 1911; Abstrs. 1059 and 1060, March 1911; Abstr. 1584, May 1911; and Abstr. 1978, June 1911. (*Ed.*).

In the Fiji Islands occurs another sugar-cane leaf-hopper, *Perkinsiella vitensis*, but it does no damage, being kept in check by several natural enemies. The most important of these are the egg-parasites, *Ootetrastichus*, *Anagrus* aud *Paranagrus*.

The "Hawaiian sugar-cane borer" ([*Sphenophorus*] *Rhabdocnemis obscurus* Boisd.) infesting the cane stalk in Hawaii is the grub of a beetle belonging to the family Calandridae.

Besides sugar-cane, the beetle infests banana, cocoanut palm, sago palm (1), royal palm (2), wine palm (*Caryota urens*) and papaya (*Carica papaya*).

The sugar-cane borer of Hawaii is also recorded from Fiji, New Guinea, New Ireland, Tahiti, Queensland and the Malay Archipelago and probably occurs pretty generally throughout the islands of the southern Pacific.

The "sugar-cane stalk-borer" of the Southern United States is the caterpillar of a moth, *Diatraea saccharalis* Fab.

[*Sphenophorus*] *Metamasius sericeus* Oliv. is a species injurious to cane in the West Indies, being recorded from Jamaica, Barbados, St. Kitts, Antigua, St. Lucia and British Guiana.

In Porto Rico *Sphenophorus sexguttatus* Drury is recorded by Busk (*U. S. Dept. of Agric. Bureau of Entomology, Bul.* 22, p. 89, 1900) as boring in the stalks of sugar-cane.

The "Hawaiian sugar-cane leaf-roller" (*Omiodes accepta* Butl.) is the caterpillar of a native moth. The larvae were collected also from "Hilo grass" (*Paspalum conjugatum*), growing wild above the cane areas. The species is attacked by several introduced parasites, the best of which are *Macrodyctium omiodivorum*, *Chalcis obscurata*, *Frontina archippivora* and *Trichogramma pretiosa*.

The "Sugar-cane mealy bug" of Hawaii (*Pseudococcus calceolariae* Mask.) is identical with the sugar-cane mealy bug common on cane in the southern parishes of Louisiana. The species is recorded by Mrs. E. Fernald from Australia, Hawaii, Fiji, Jamaica, and Florida (*A Catalogue of the Coccidae of the World - Bul* 88, *Hatch Exp. Sta. Mass. Agr. Coll.* p. 98, 1903).

Koebele earlier records this mealy-bug on cane in Hawaii. Mrs. Fernald gives the food plants of the sugar-cane mealy bug as *Calceolaria*, *Danthonia*, *Phormium tenax*, *Cordyline australis*, and

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(1) Sago palm = *Cycas revoluta* Thunb. (BAILEY, *Cyclopedia of American Horticulture*, Vol. I, p. 424. New York, 1909). (*Ed.*).

(2) Royal palm = *Oreodoxa regia* (ibid., vol.I V, p. 1578). (*Ed.*),

sugar cane. In Louisiana the mealy-bug infests, besides sugar-cane, Johnson grass (*Sorghum halepense*) and the saccharine sorghums.

A ladybird beetle, *Cryptolaemus montrouzieri* Mouls., which is a special mealy-bug feeder, has been introduced, into Hawaii from Australia, by Mr. Koebele.

Miscellaneous insects affecting sugar-cane in Hawaii - *Aphis sacchari* Zehntn. is occasionally injurious to sugar cane. In moist places a mole cricket, *Gryllotalpa africana* Beauv., is sometimes abundant enough to be injurious. *Scapteriscus didactylus* Latr., is a most important pest of sugar cane in the island of Porto Rico.

Certain army worms and cutworms, among them *Heliophila unipuncta* Haw., *Agrotis ypsilon* Rott., and *Spodoptesa mauritia* Boisd., are occasionally known to strip fields of young cane.

A bud moth, *Ereunetis flavistriata* Wlsm., is found generally throughout the Hawaiian cane fields and at times is quite numerous.

The grasshoppers *Xypidium varipenne* Swezey and *Oxya velox* Fab. feed to some extent on the leaves of cane. The former species is also predatory in habit, attacking the young leafhoppers and the larvae of the sugar-cane leaf-roller.

Two species of beetles which occasionally invade the cane fields are *Aramigus fulleri* Horn. and *Adoretus tenuimaculatus* Waterh.

Rats injuring growing sugar-cane in Hawaii. The so-called roof-rat (*Mus alexandrinus*) in former years was very common in the cane fields of Hawaii and did considerable damage by eating the stalks. At the present time it has been driven to a great degree from the cane fields by the introduced mongoose (1). On the other hand, this animal is an undesirable acquisition to the fauna of the islands; for in recent years it has included in its dietary the eggs and young of ground-nesting birds and the domestic fowl.

2358 **The Green Scale (*Coccus viridis*) of Coffee and Tea Plants in Ceylon.** — *The Agricultural News*, Vol. X, No. 233, p. 106. Barbados, April 1, 1911.

Ceylon In the report of the Government Entomologist of Ceylon for 1909, mention is made of the Green Scale (*Coccus viridis* = *Lecanium viride*), which was a serious pest of coffee a few years ago. Since

(1) Mongoose, or Ichneumon (*Herpestes mungo*); this Indian mammal was first introduced into Jamaica in 1872 to destroy rats; after doing good work for a time, it itself became a pest, but now seems to be declining in numbers. F. FINN, in *Encyclopedia Britannica*, Vol. I, p. 119. Cambridge, 1910. (*Ed.*).

the abandonment of coffee cultivation, this insect has shown a tendency to establish itself on tea in certain districts; and in one area it has assumed the proportions of a serious pest. At the time o the writing of the report, it was abundant in one district only, but there are indications that it may become a pest of tea.

The Ceylon Entomologist could not account for its prevalence in one district in destructive numbers, since it had been equally abundan t in all the coffee-growing districts, and is still generally distributed throughout the island; besides, there seems to be no reason why it should not adapt itself to act in one section as well as another.

The suggested control measures are the burning of prunings, and the spraying of the trees with kerosene emulsion, except when the plants are groving new shoots, or "flushing", when a simple mixture of soap and water should be used.

The removal of the wild food plants from the vicinity of tea cultivation is recommended, in order that re-infestation may not so readily take place from outside.

GEORGES BELLAIR. **Red Spider attacking Salvia.** (L'Acarien des Salvias). — *Revue horticole*, 83e An., N. 10, pp. 231-232. Paris, 16 Mai 1911. **2359**

French gardeners use the names "grise" and "araignée rouge" for an acarid: (generally the "web acarid", *Acarus* or *Tetranychus telarius*.

This acarid, or other species, is found on a number of plants: haricot beans, melons and other *Cucurbitaceae*, rose, peach, *Achyranthes*, *Ageratum*, and more especially on *Salvia splendens* and its varieties. **France**

To obviate the damage it does to Salvia plants, and others cultivated in green-houses or under frames, the writer advises watering the path-ways and gently syringing the plants; also shading them slightly by washing the glass of the frames or houses with milk of lime, or covering these with sacking.

To destroy this parasite the writer advises that the plants be dipped in an insecticidal solution (10 litres of water, 100 cub. cm. of tobacco juice, 100 cnb. cm. of spirits of wine, 100 gms. of black soap, 100 gms. of carbonate of soda; or else 10 litres of water, 125 gms. of black soap, 200 gms. of flowers of sulphur, 100 gms. of treacle) (1).

(1) 100 gms. in 10 litres is equivalent to 1 lb. in 10 gallons (English). (*Ed.*).

2360 F. H. CHITTENDEN. **Notes on various Truck-Crop Insects.** — *U. S. Dept. of Agric., Bureau of Entomology Bul.* 82, Part VI, pp. 85-93. Washington, February 18, 1911.

United States. West Indies

On the natural Enemies of the Potato Beetle. — A list of the recorded natural enemies of the " Colorado potato beetle " (*Leptinotarsa decemlineata* Say) has been compiled by the writer (*Circ.* 87, *Bureau of Entomology Dept. of Agric.* pp. 10-12, June 3, 1907). A few species not previously recorded have since been reported and these are mentioned here. They are: *Pterosticus lucublandus* Say., *Apateticus* (*Podisus*) *marginiventralis* Say., *Perilloides* (*Perillus*) *bioculatus* Fab. *Euthyrhynchus floridanus* L.

The last named species was also observed attacking the " Green plant-bug " (*Nezara hilaris*, Say.) on eggplant, and the " Black walnut caterpillar " (*Datana integerrima* G. and R.).

To the list of wild birds known to feed on the Colorado potato beetle, furnished in Circular 87 of the U. S. Burreau of Eutomology, are to be added the grosbeaks (1) and the chipping sparrow (2).

The efficiency of the Guinea fowl as a destroyer of this and other garden pests is stated by two correspondents.

Notes on the Potato Stalk Weevil. — The chalcid parasite *Eurytoma tylodermalis* Ashm. was reared from stems of *Solanum carolinense* infested by the " potato stalk weevil " (*Trichobaris trinotata* Say) and collected by the writer in the district of Columbia.

Maggots affecting Yams in the South. — The " sweet potato borer or weevil " (*Cylas formicarius* Fab.), *Lonchaea longicornis* Will., *Euxesta nitidiventris* Loew and *E. thomae* Loew. were reared from a yam (*Dioscorea alata*), badly affected with maggots and sent from Nassau, British West Indies.

Notes on the feeding habits of " Blister Beetles ". — The writer has observed: the " margined blister beetle " (*Epicauta marginata* Fab.) feeding on beets; the " striped blister beetle " (*E. vittata* Fab.) feeding on the " rough pigweed " (*Amaranthus retroflexus*), which the beetles almost completely defoliated; the " margined blister

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(1) Grosbeaks. The best-known American representative is the Evening Grosbeak (*Hesperiphoma vespertinus*), which occurs over western temperate North America, from the British Provinces to the highlands of southern Mexico. (F. H. KNOWLTON, *Birds of the World*, p. 832. Westminter, 1909). (*Ed.*).

(2) Chipping sparrow (*Spizella passerina*) is found in abundance throughout the Eastern United States and the British Provinces, west to the Great Plains. (KNOWLTON, *ibid.* p. 842). (*Ed.*).

beetle " and the " black blister beetle " (*E. pennsylvanica*) doing considerable injury to garden beets and chards. Finally great numbers of the " black blister beetle " and small numbers of the " sweet potato blister beetle " (*E. trichrus* Pall.) were observed on Asters and related plants at Norfolk.

Notes on Bean and Pea Weevils. — The family name Lariidae has been adopted by European systematists for the Bruchidae. The following note includes the European nomenclature :

Laria rufimana Both., the " broad bean weevil ". This species, called also the " European bean weevil ", has recently been introduced at San Luis Obispo, Cal.

L. pisorum L., the " pea weevil ".

L. lentis Froel., the " lentil weevil ".

The lentil weevil appears to be restricted to the lentil for food. It is well distributed in Europe, but has not got introduced into the United States.

Bruchidius Trifolii Notsch. A species frequently received in the United States from Egypt, in seeds of *Trifolium alexandrinum*, not known to be established in America.

Acanthoscelides obtectus Say., the " common bean weevil ".

Pachymerus chinensis L., the " cowpea weevil ".

Pachymerus quadrimaculatus Fab., the " four spotted bean weevil ".

Potato Moth (1) **attacking Tomatoes in New Zealand.** — *Journ. of the New Zealand Dept. of Agriculture*, Vol. 2, No. 6, p. 323. Wellington, June 15, 1911. **2361**

The " potato moth " (*Gelechia operculella*), has been quite prevalent in tomatoes in the Christchurch district. This is the first time that this insect has been recorded as injurious to this crop in New Zealand. The fruit appears to be the portion of the plant mainly attacked, but it is probable that the caterpillars will also be found feeding on the interior tissues of the leaves. Unlike the true " tomato moth " (*Heliothis obsoleta*), the potato moth appears to prefer attacking the tomato when quite hard and green. Timely spraying with arsenate of lead should stop the potato-moth from ever becoming a serious enemy of the tomato. Lea, of Tasmania, has recorded this insect as attacking the tomato, but he says its effects are in general restricted to the foliage. **New Zealand Tasmania**

(1) See Abstr. 1973, *Bulletin*, June 1911. (*Ed.*).

2362 ***Scolopendrella californica* on Asparagus and on Lima Beans and other Seed Crops. in California** — *California Cultivator*, Vol. XXXVI, No. 25, p. 740. Los Angeles, June 22, 1911.

United States: California

Horticultural Commissioner Beers of Santa Barbara County, California, has reports from some sections of this district that much damage was done this season to lima beans (*Phaseolus lunatus*) and other seed crops by a very small centipede, *Scolopendrella californica*.

These centipedes are undoubtedly fond of vegetable growth, as they destroy lima beans, garden beans, asparagus, sprouting corn and melon seeds in the stage of bursting forth from the covering; they have up to the present been supposed to feed on minute insects.

2363 **Remedy for Pumpkin Beetle *(Aulacophora oliverei)*.** — *Agricultural Gazette of New South Wales*, Vol. XXII. Part 2, p. 143. Sydney, February 2, 1911.

Australia: New South Wales

Mr. D. M. Ross, of Lismore, New South Wales, tried dusting with ashes and lime mixed, to keep « pumpkin beetles » from his pumpkin-vines, and reports that it was a great success.

In 1908, when the beetles were exceptionally bad, many correspondents stated that ashes and lime would not keep them away. It would appear, therefore, that this simple remedy is effective except when the beetles are exceptionally numerous.

In the latter case, the only remedy seems to be to use some arsenical spray or dust, such as Paris green or arsenate of lead.

2364 O. Brooks. **Fruit Flies in New South Wales.** — *Agricultural Gazette of New South Wales*, Vol. XXII, Part 4, p. 312. Sydney, April, 1911.

Australia: Queensland, New South Wales

The Queensland Fruit Fly (*Dacus Tryoni*) appeared in the orchards of Gosford, Northumberland District, New South Wales, about the middle of August, 1910, and could thereafter be seen on the wing wherever « Emperor » mandarins were growing. Only when the mandarins were finished was infection found in the oranges and then it was generally slight. The early appearance of the fly was probably due to the mild winter and early spring and to the fact that there were none of its natural foods (wild plums etc.) ripe at the time.

The writer's observations confirm the idea that the Queensland Fruit Fly generally prefers its natural food, the wild fruits, to orchard fruits.

Slight infestations of Island Fruit Fly (in damaged fruit or fruit already punctured by another fly) and Mediterranean Fruit Fly (*Ceratitis capitata*) early in the season, were alsoo bserved. But flies hatched out by Mr. Brooks from orchards, in different parts of the district during the latter part of the season, always proved to be the Queensland species.

W. W. Froggatt. **White Ants and Fruit Trees.** — *Agr. Gaz. of New South Wales*, Vol. XXIII, Part 6, p. 548. Sydney, 2 June 1911. **2365**

For the purpose of preventing white ants (*Termes* spp.) from damaging young fruit-trees, the main thing is, before planting, to see that all dead wood is taken out of the ground, and that the ground is thoroughly cleaned up. The trees to be planted should be overhauled, and any damaged roots cut out. **Australia: New South Wales**

The writer has found that German potash manure (kainit) will drive white ants out of any soil where it is used as a manure.

A pound or so of kainit mixed with the soil when planting should be sufficient for each tree.

R. W. Thatcher. **Controlling the Red Spider** (1) **on Vines under Glass.** — *The Gardeners' Chronicle*, Vol. 4, No. 1280, p. 7. London, July 8, 1911. **2366**

The writer considers attacks of red spider on vines in houses may be due to too much heat at flowering time, and also to lack of water. He recommends a good soaking of water for the borders before flowering and again after thinning. **Great Britain**

To get rid of red spider he advises the application of milk of sulphur on the pipes, when they are very hot; directly the sulphur begins to fume the fire should be stopped and the house shut down for an hour; then the ventilators should be left slightly open for the night and through the following day.

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(1) See Abstr. 1998 of this *Bulletin* for June 1911. (*Ed.*).

2367 W. Le Gay Brereton. **Experiments with Red Oil Emulsion against Green Aphis on Peach Trees at Glen Innes Experiment Farm Orchards, New South Wales.** — *Agricultural Gazette of New South Wales*, Vol. XXII, part 4, p. 334. Sydney, April 3, 1911.

Australia: New South Wales

An experiment was carried out last season by the writer at the Glen Innes Experiment Farm Orchard, with the use of red oil emulsion on peach trees, against Aphis. It proved absolutely successful. The strength of the mixture was in the following proportions: 1 gallon red oil, 1 lb. common yellow soap, 20 gallons water. The emulsion was applied when the trees were quite dormant, on 29 July, 1910 (in New South Wales). Only one spraying was necessary.

2368 C. Campbell. ***Aleurodes olivinus.*** (A propos de l'*Aleurodes olivinus*). — *La Petite Revue agricole et horticole*, 17 An., N. 400, pp. 171-172. Antibes, 3 Août 1911.

Italy. Spain. Tunis. Asia Minor

The writer calls attention to the fact that *Aleurodes olivinus*, — described by Professor Silvestri as a new olive parasite in Central and Southern Italy, and recently recorded by Mr. Chapelle as a new olive pest in Spain (1) — is not only found in Italy, but also in Tunis where the writer has himself found specimens. He also noted its presence et Smyrna.

A. olivinus is, therefore, more widely spread than was hitherto supposed; and it has only escaped investigation because of the small number of individuals, and still more because of the insignificant amount of damage it causes.

Mr. Campbell would not be surprised if attentive examination were to reveal its presence in French olive yards.

The writer does not think that olive growers need fear it; it is undoubtedly one of the many species which appear on decaying trees; but the injury it does is not such as to make it a cause of death to the plant.

2369 **The Control of the Olive-Fly and Prof. Lotrionte's experiments.** (I metodi di lotta contro la Mosca delle olive e gli esperimenti del Prof. Lotrionte). — *Rivista agricola romana*, Anno XLI, N. 5, pp. 111-117. Roma, Maggio 1911.

Italy: Latium

As far back as 1903-1904, Prof. G. Lotrionte, Travelling agricultural teacher at Tivoli, near Rome, made a special study

(1) See Abstract 2000, *Bull.* June, 1911.

of the substances which most attract and nourish the Olive-Fly (*Dacus Oleae*). He observed that of all sugary substances, those which the fly likes best are the syrupy glucose of commerce, honey, and the juice of fresh figs; grape juice, fruit jams, etc., attract it less. Treacle as a rule does not attract this fly, or only to a very slight degree, and when exposure to the air has done away with its peculiar and penetrating smell.

The effects of poison on flies bred in cages have been studied; and numerous, and patient investigations have shown that not only dangerous arsenates and alkaline arsenates, but many other substances are poisonous to these flies, amongst others copper salts (sulphate and acetate), salts of barium, lead, zinc; etc.

Mr. Lotrionte has also made a careful study of aromas or scents most attractive to the fly, the influence of coloured light, etc.

As a result of these studies and observations, it is suggested to use a mixture composed of syrupy commercial glucose and sulphate of copper, which offers the following advantages as compared to mixtures of treacle and arsenates:

1) Instead of being more or less repulsive, it is very attractive to the olive-the fly;

2) its use is less dangerous to man; and Mr. Lotrionte believes that it need cause no anxiety as to the fitness of the olives for human food;

3) instead of drying rapidly on the leaves, as is the case with treacle, glucose retains its sticky quality for a long time its hygroscopic energy being increased (according to the observer) by the presence of copper sulphate;

4) the copper sulphate contained in this mixture makes it also valuable in controlling olive-leaf spot disease (« occhio di pavone » the « olive-leaf blotch ») caused by *Cycloconium oleaginum*;

5) it has a valuable stimulating effect on the growth of the plants, imparting to the foliage a more intense green, just as Bordeaux mixture has on the vine, also owing to the copper sulphate it contains;

6) lastly, always thanks to the presence of copper sulphate, not only does it not favour, but it hinders, the development of the dreaded « *fumagine* » or Fumago which has almost always made its appearance on olive trees treated with treacle mixtures.

Prof. Lotrionte has pursued his enquiries in the laboratory and in olive-yards in different localities.

His experiments have demonstrated first of all that syrupy glucose is vastly more attractive than treacle; in the second place it has been shown that an olive-grove, properly isolated (distant about

1 kilometer from the other olive groves of the neighbourhood), which had been sprayed four or five times with a mixture of syrupy glucose diluted with 20 % of water and 2 % of copper sulphate, was scarcely infected, 0.33 %, or 1 infected olive out of 300. Whereas olive groves which had not been thus treated were infected to an extent of 9 to 23 %. Besides, all the olive trees treated with this mixture were in excellent condition, free from all symptoms of « fumago », and from attack of *Cycloconium*.

On the strength of these results a meeting of olive-growers at Poggio Mirteto, passed a resolution calling on the Italian Ministry of Agriculture, to continue these studies on the control of the Olive-Fly, and to test the Lotrionte and other treatments.

2370
Turkey in Asia: Brûssa

The Olive-Fly in the Sanjak of Brûssa. — See Abstract 2038, this *Bulletin*, July, 1911.

2371

Ed. R. Kone. **Systematically Eradicating the Citrus White Fly in Texas** (1). — *Citrus Fruit Grower*, Vol. I, No. 4, p. 18. Houston, Texas, March, 1911.

United States: Texas

The Texas State Department of Agriculture is making energetic efforts to control the White fly in South Texas. The department has a number of representatives in the field aiding the growers in their efforts to rid their premises of the greatest menace to the citrus industry of Texas.

Not only is the war of extermination being waged by the department against the white fly, but all kinds of scale and other insect pests afflicting peach, pear, apple, plum and other fruits.

2372
German N. Guinea

« Black Beetle » (*Orictes Rhinoceros*) injurious to Cocoa-nut Palms in Kaiser Wilhelms Land and in the Bismarck Archipelago. — See Abstract 2040, this *Bulletin*, Jnly, 1911.

(1) White Fly = *Aleyrodes* spp. See this *Bulletin*, June 1911, Abstr. 2001: previous refs. in footnote. (*Ed.*).

C. L. MARLATT. — **The Mango Weevil (*Cryptorhynchus mangiferae* Fab.)** — *U. S. Dept. of Agric. Bureau of Entomology, Circular* 141, pp. 4. Washington, June 1911. 2373

The most noxions insect pest of the mango in Oriental countries is the mango weevil (*Cryptorynchus mangiferae* Fab.). It is probably of Indian or at least of Oriental origin; and has already obtained foothold in most of the important mango-growing countries, being carried readily with seed for planting. It now inhabits all of the mango regions bordering on the Indian Ocean and adjacent islands, and occurs throughout the East Indies, including the Philippines and other groups of South Pacific islands. It has gained foothold similarly in South Africa and Madagascar and numerous other points. In the Hawaiian Islands, Mr. D. L. Van Dine reports that, during the first year of his examination, he found 60 per cent of the mangoes infested, and the following year from 80 to 90 per cent, in some instances as many as 4 larvae being found in a single seed.

Tropical Asia. Africa. Pacific Islands

The egg of the mango weevil is deposited in the fleshy part of the fruit. The young grub burrows at once into the seed pod; and develops in the seed to a pupa and finally to the adult. Inasmuch as this insect passes its entire development within the seed, it is beyond the reach of insecticides and fumigation.

The United States are so far free from this pest. Therefore as shipments of mango seeds now coming to Florida are largely infested with the mango weevil, it is most urgently important for this State to keep the weevil out.

The only means of determining infestation is by opening the seed pod and removing the paper-like covering of the seed itself, when the work of the larvae and weevil can be noted. Therefore, all seeds introduced for planting should be opened in this manner and all that indicate infestation should be burned.

E. E. GREEN. **Coccidae Collected on Rubber Plants in Ceylon.** *Nature*, No. 2174, Vol. 86, p. 593. London, June 29, 1911. 2374

In *The Journal of Economic Biology* (Vol. VI, No. 2), Mr. E. E. Green presents an enumeration of several species of Coccidae, with diagnoses of those new to science, collected on rubber plants in Ceylon. *Lecanium viride* was the most important found on *Hevea brasiliensis*; as it occurred chiefly on young trees it was amen-

Ceylon

able to treatment by spraying. A new species, *Inglisia Castilloae*, was perhaps the most dangerous, as it spread from the Castilloa to tea shrubs in the vicinity; but it did not attack the closely adjacent Hevea trees. Another of the species is a lac insect that spread thickly on a *Landolphia* vine.

Other Pests.

2375 Hawaii

Black Rats (*Mus Alexandrinus*) injurious to Sugar-Cane in the Hawaiian Islands. Controlled by the Mongoose. — See Abstract 2357, this *Bulletin*, July 1911.

2376

Woodpeckers and Cocoa. — *The Journal of the Jamaica Agricultural Society*, Vol. XV, No. 2, pp. 70-71. Kingston, February, 1911.

In Trinidad, an enquiry is being made into the relation of woodpeckers (1) and birds of a similar type to the cocoa industry.

The result of the inquiry is summed up as follows :

Trinidad. Tobago

« It will thus be seen that opinions differ greatly. While the majority of Tobago planters aver that the damage is fairly considerable, ranging from 10 to 30 per cent in extreme cases: the Trinidad planters, with few exceptions, are agreed that it does little harm, many of them assessing the damage at about 1 per cent.

« Many planters hold that the Woodpeckers only make holes in the ripe pods, so as to attract insects to the damaged spots and return to eat the insects; others say that it bores holes in the pods, so that it may eat the mucilage surrounding the ripe bean. Only one case is on record of a Woodpecker being shot in the act of boring holes in the pods, fresh pulp being found in the bird's crop ».

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(1) See Abstr. 366 of this *Bulletin* for Jan. 1911, and 700 in Feb. 1911. (*Ed.*).

The most recent opinions are that there are two different types, and that one does at certain periods feed on the juice of the pulp.

« Under these circumstances, it would seem that if the damage is small when regular systematic picking is adopted, there should be considerable hesitation in destroying Woodpeckers of all kinds, since some of them possess habits which are distinctly useful, and others may only under adverse conditions injure the cocoa pods ».

Legislative and Administrative Measures for the Protection of Plants.

Measures to be taken in France in obtaining Samples of Fungicides. 2377

(Arrêté fixant les mesures a prendre ponr le prélèvement des échantillons d'engrais, amendements et produits pour la destruction des cryptogames et autres parasites). *Annales des Falsifications* (*Bulletin international de la répression des fraudes*), 4me An., N. 32, pp. 190-191. Paris, Juin 1911.

The Minister of Agriculture, under date of May 15th, 1911, decrees:

Art. 1. — Four samples of any product to be examined must always be taken. These four samples must be identical. **France**

Art. 2. — The quantities to be taken and the methods to be used in obtaining homogeneous samples are the following:

Fungicides.

Sulphate of copper.	Copper mixtures.
Sulphate of iron.	Acetates of copper.
Sulphur.	Sundry products.

Each sample, consisting of about 250 gms., is placed in a clean, dry, glass jar, which is at once corked and sealed.

In the case of copper mixtures, acetates of copper, and in general powders formed by mixing various products, the following precautions must be strictly observed in taking simples:

When the product is contained in a tin, or sold in packets, the whole contents of the tin or packet are to be spread on a sheet of paper, care being taken to spread the material out evenly; and from different parts of this mass about 1 kg. shall be taken. This quantity in its turn is placed on a sheet of paper, mixed, and divided into four equal parts, each to be used as one of the four samples.

When the product is contained in a sack which it is practically impossible to empty entirely, about one kg. of the mixture shall be taken out with a ladle, from different parts of the whole; then the different portions shall be mixed on a sheet of paper, and treated in the same way as above.

2378 **Decree for the Protection of French Colonies and Protectorates against *Hemileia vastatrix*.** (Décret relatif à la protection des Colonies et Pays de Protectorat contre l'*Hemileia vastatrix*). — *Journal Officiel de la Republique Française*, 43e An., N. 204, p. 6481. Paris, 30 Juillet 1911.

The President of the French Republic, under date of July 26th 1911, has decreed:

French Colonies and Protectorates

Art. 1. — To prevent the spread of the coffee-tree disease known as *Hemileia vastatrix*, the Colonial Minister may issue special decrees, prohibiting the importation into Colonies and Protectorates, other than Algeria and Tunis, of:

1. Coffee-trees;

2. Other living trees and plants which may act as transmitters of this disease.

The list of such trees and plants will be drawn up, if required, by the Governors-general and Governors.

Art. 2. — The Colonial Minister determines the conditions on which, in case of need, and in the absence of the prohibition provided for in the previous article, coffee-trees, and other living trees and plants which may transmit *Hemileia vastatrix*, may enter and circulate in the Colonies and Protectorates, other than Algeria and Tunis.

He shall also determine the conditions under which branches, leaves, fruit, seed, and waste of coffee-trees and the aforesaid

trees and plants may enter and circulate in the Colonies and Protectorates.

Art. 3. — Violations of the measures taken by the Colonial Minister for the enforcement of articles 1 and 2 of this decree are punishable with a fine of from 50 to 500 francs.

Art. 4. — Persons who by fraudulent practices introduce into the Colonies and Protectorates, other than Algeria and Tunis, coffee-trees, shade-trees and other living plants, the entry of which has been prohibited by the Colonial Minister in virtue of art. 1. of this decree, are liable to imprisonment for from one to fifteen months, and to a fine of from 50 to 500 francs, or to one or other of these penalties.

Art. 5. — The penalties foreseen under the two previous articles will be doubled in the case of second offenders.

The defendant is considered a second offender if within the twelve preceding months he has been convicted under the present decree.

Art. 6. — Extenuating circumstances are granted; the courts are authorised, even in the case of second offenders, to reduce imprisonnment to less than one month, and the fine to less than 50 francs, but without reducing these penalties below the limits inflicted by the ordinary police courts.

O. BORDIGA. **The Work of the Associations for the Control of Phylloxera in Apulia and Teramo, in Italy.** (L'opera dei Consorzi di difesa contro la fillossera). — *La Rivista Agraria*, Anno XXI, N. 22, pp. 269-271. Napoli, 4 Giugno 1911. **2379**

The control of Phylloxera in Apulia and the Province of Teramo is directed by special Associations, supported by compulsory contributions paid for each hectare of ground under vines, and by subsidies from the State. **Italy: Apulia, Abruzzi**

These Associations are distributed as follows:

Provinces	Associations Number	Area under vines (ha.)	Area paying contributions (ha.)
Bari	34	142 653	111 045
Foggia . . .	6	186 758	152 741
Lecce	11	319 086	258 866
Teramo . . .	2	4 393	3 908
	53	652 890	526 560

The management and mode of proceedure is entrusted to 29 teehnical delegates, who act at the same time as teachers, for the improvement of agriculture.

The first step was to plant nurseries for American vines, taking care to select plants coming from the Tremiti Islands, so that the vines might be free from all disease, especially from « roncet ». 127 ½ hectares were planted with 485 263 vine stocks, distributed among 79 nurseries. The rooted grafts distributed from the year 1903 to 1908 numbered 1 902 104.

In 1909, 208 experimental vineyards were in operation, covering 75 ha., containing 367 168 vines.

The Associations have opened sheds for disinfecting the tools and boots of the workers, who receive certificates of disinfection. 60 000 such certificates were given in one year at Cerignola alone.

In 1909, practical and thecretical courses in grafting were attended by 9 500 workmen.

The technical staff of the Associations possesses special laboratories for analysing grapes, must, wine, alcohol and tartar; the staff does much to promote cooperation in wine-production.

2380 United States: Minnesota

An Act for the Destruction of Grasshoppers in the State of Minnesota. — See Abstract 2322, this *Bulletin*, July, 1911.

2381

The International Control of Locusts. (Defensa internacional contra la langosta). — *Revista de la Asociación Rural del Uruguay*, año XL, N. 5, pp. 381-382. Montevideo, Mayo de 1911.

Argentine Uruguay Brazil Bolivia

Neighbouring countries suffering from invasions of grasshoppers are interested in associating for the effective control of this pest, by means to which each State singly cannot usefully have recourse. An organization of this kind should be created between Argentina, Uruguay, Brazil, and Bolivia, to drive the grasshoppers from the south, northwards.

Such an organization should be technical; that is to say, the means must be found for controlling the grasshoppers easily by basing all action on a geographical principle, that of driving them north. It is impossible to form a zone of concentration and destruction within the boundaries of the States in question, because of the immense area such a zone would have to embrace.

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Mrs. Olivia Agresti-Rossetti, Miss Florence M. Mac ver and Dr. A. Brodrick-Bullock are provisionally attached to the Bureau as English translators.

The information contained in some of the abstracts dealing with Canada has been most kindly placed at the disposal of the Institute by the Government of the Dominion.

The Canadian abstracting is by Mr. J. K. Doherty, the able chief of the Canadian Bureau of Correspondence with the International Institute of Agriculture.

AGRICULTURAL INTELLIGENCE

NB. The Intelligence contained in the present Bulletin has been taken exclusively from the books, periodicals, bulletins, and other publications which have reached the Library of the International Institute of Agriculture in Rome during the months of August, September and October 1911.

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The Editor's notes are marked (Ed.).

Development of Agriculture in Different countries — Scientific Institutions — Education in Agriculture and Forestry — Experimentation — Biography — History of Agriculture.

VELTEN. (French Consul). **Agricultural Production in Ireland.** (La Production agricole en Irlande). — *Bulletin mensuel de l'Office de Renseignements Agricoles.* No. 5, pp. 630-647. Paris, Mai, 1911. 2382

The most important cereal crop in Ireland is oats, of which some 1 000 000 tons are produced annually, chiefly black oats. From 60 to 70 000 tons are exported to Great Britain and the Continent. Irish oats hold the 5th place on the British market.

Ireland supplies the British market with most of its cattle, which is the chief Irish export. 838 583 head of cattle were exported to Great Britain in 1909. Half of the Irish exports are young animals which are fattened in England and Scotland. Ireland has a practical monopoly of this branch of trade. Unfortunately the Irish stock-breeder thus fails to obtain the profits which he would realise, were he to fatten his stock in Ireland. United Kingdom Ireland

After live-stock, butter is the chief Irish export (1). The butter trade is valued at about 100 000 000 frs (£. 4 000 000) per year.

The soil and climate of Ireland are particularly suited to breeding hunters. The number of horses is increasing. In 1909 Ireland exported 29 635, valued at 34 234 009 frs. (a little over £.1 369 360). 70 % of the British Army remounts are supplied by Ireland. 874 300 sheep were exported in 1909. The decline in these exports is due to the large quantities of frozen mutton, which reach England from various countries.

Irish eggs hold the second place for value and quantity on the British market, after Russia. In 1909 they were valued at 71 580 525 francs. (£.2 863 221).

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(1) See Abstract 910, *Bulletin* March, 1911.

The annual value of Irish eggs is estimated approximately at 100 000 000 francs. (£.4 000 000). This figure could be considerably increased by improving the laying breeds and by better feeding.

The crop which occupies the largest acreage in Ireland after oats is potatoes. A large trade is done in them with Great Britain. In 1909, 119 785 tons were exported, and they hold the first place on the British market. The Irish potato crop generally exceeds 3 000 000 tons.

In 1910, only 324 041 live pigs were exported ; the exports of bacon and ham amounted to 86 667 000 francs. (£.3 466 680). Ireland also exports a considerable number of hams to France.

The poultry exports are increasing, and have attained a value of 21 432 000 francs. (£.857 280). Ireland exported more poultry to Great Britain than any other country.

The Department of Agriculture encourages farming on small holdings, as there is a ready and profitable market for the same in England. In the last 10 years the stock of poultry is said to have risen in Ireland from 18 to 24 million birds.

2383 **Budget of the Department of Agriculture (France).** The Decree Fixing the General Budget of the Working Expenditure and Receipts for the Year 1911. (Le Budget du Ministère de l'Agriculture en France. Loi portant fixation du budget général des dépenses et des recettes de l'exercice 1911). — *Journal Officiel de la République Française*, Paris, 14 Juillet 1911.

The credit voted for the use of the Department of Agriculture reached a total of 53 751 173 fr. (£ 2 138 546) which was apportioned as follows :

France

General Service 39 781 523 fr. (£ 1 531 788).

Expenses of administration, collection of taxes etc. 14 987 600 fr. (£ 599 504).

Compensation, restitution etc. 12 000 fr. (£ 475).

The following is a list of some of the most interesting special items of expenditure.

	Frcs.	Pounds Sterling
Grants to Mutual Insurance Societies, Expenses of supervision and control .	1 185 000	461 926
Help given to Farmers at times of agricultural distress	1 840 000	72 864
Assistance to Silk-worm rearers who suffered from the bad season of 1910. . .	420 000	16 632

	Frcs.	Pounds Sterling
Departmental Professors and Agricultural Experts	804 200	31 847
National Agric. Institute	324 600	12 855
National Schools of Agriculture	750 200	30 707
Practical Schools, Farming Schools, Various State Establishments and Stations, Grants to different Agricultural Institutions	1 891 800	74 915
Encouragement to Agriculture	2 110 020	83 557
Premiums for Sericulture	5 000 000	198 000
Premiums for Cultivation of Flax and Hemp	2 275 000	90 090
Premium for Cultivation of the Olive-tree	2 000 000	79 200
Veterinary Colleges	1 037 600	41 088
Service for Control of Infectious Diseases	303 000	11 999
Indemnity for slaughter of animals, seizure of meat infected by tuberculosis etc.	1 600 000	63 360
Stud Expenses	6 928 133	274 354
Encouragement of Horse Breeding	1 327 000	52 549
Irrigation and Agricult. Improvements (schools, grants etc.)	4 655 220	184 347
Repression of Fraud	1 090 000	43 164
The Staff of the Woods and Forests and the Officials of the departments	5 770 010	227 492
Instruction in Forestry	186 100	73 695
Improvement and keeping up of Forests and Dunes. Fisheries and Pisciculture. Grant for Improvements of Grazing-lands and Woods	1 253 500	49 639
Restoratiou and Protection of Mountain lands	3 500 000	138 600

Agriculture and Stock-breeding in Germany. (Deutschlands Handel und Industrie) — *Gummi-Zeitung*, No. 47, p. 1821-1827, Berlin, 25 Aug. 1911. 2384

Germany

Though agriculture is no longer the main source of wealth in Germany, as it was 50 years ago, it still holds a foremost place in the development of the country.

With the assistance of science, more especially of chemistry and of mechanical knowledge applied to agricultural machinery, the methods of farming have been greatly improved and perfected in recent years.

The following figures given for the average yield in quintals (1) per hectare (2) indicate the constant improvement made in the systems of cultivation and the ratio between yield and area :

	Rye	Wheat	Barley	Potatoes	Oats	Hay
Averages from 1878 to 1880 . . .	10.0	13.3	13.4	75.0	12.1	36.8
» 1904 to 1909 . . .	18.5	20.5	21.2	149.5	21.2	37.1

On the other hand remarkable progress has been made in the cultivation of fruit ; in 1900 the number of fruit-trees (apple, pear, plum and cherry trees) was already about 168 millions (3).

Viticulture has also progressed. Although restricted to the south-west of Germany, the vineyards produce famous wines, such as those of the Rhine, the Main and the Moselle. The hop-gardens are very important and tobacco is cultivated to a great extent.

(1) quintal = 220.46 lbs.

(2) hectare = 2.4711 acres.

(3) In 1900 there were within the Empire 168 532 000 fruit trees, comprising 52 332 000 apple-trees, and 25 116 000 pear-trees, 69 436 000 plum-trees. and 21 548 000 cherry-trees.

The number of domestic animals in Germany on December 2, 1907, was:

STATES	Horses	Cattle	Sheep	Swine	Goats
Prussia	3 046 304	12 011 584	5 408 867	15 095 854	2 235 520
Bavaria.	392 091	3 725 480	735 113	2 056 222	308 150
Saxony	171 715	731 528	66 120	744 517	144 858
Alsace-Lorraine . .	138 077	544 664	67 980	502 443	63 670
Württemberg . . .	115 352	1 073 122	278 337	537 185	88 201
Baden	75 842	673 146	52 020	558 278	119 821
Other States . . .	405 662	1 871 070	1 095 273	2 652 033	573 741
Total, 1907 . . .	4 345 043	20 630 544	7 703 710	22 146 532	3 553 970
Total, 1904 . . .	4 267 403	19 331 568	7 907 173	18 920 666	3 329 881

The Statesman's Yearbook for 1911, pag. 848. (*Ed.*).

The progress of stock-breeding has kept pretty well pace with that of agriculture. With the growth of the population the demand for meat has risen : Germany ranks next after Great Britain and the United States as a meat-consuming country in percentage relation to its population. The number of pigs has constantly increased, whereas that of sheep has declined.

The following table gives an idea of the importance of the stock-breeding industry in Germany :

	Goats	Horses	Oxen	Sheep	Pigs	Poultry
1873	2,300,000	3,350,000	15,800,000	25,000,000	7,100,000	?
1907	3,500,000	3,350,000	20,600,000	7,700,200	22,100,000	77,100,000

The market value of German livestock is estimated at about 10 milliards of marks.

Dairy products are a staple article of food in Germany. It is reckoned that the total dairy production exceeds in value that of the cereal crops.

It must be remembered that live-stock supplies a large quantity of raw material to the leather and wool industries.

Agricultural Progress in Bavaria. (Fortschritte der Landeskultur). — *Der Bayerische Bauer*, No. 28, S. 2, Landshut, 9 Juli, 1911. 2385

There are still some 4 million hectares of uncultivated moor and peat bog in Germany, of which a very large portion is in Bavaria.

Experience has shown that however heavy be the cost of reclaiming such lands, the margin of profit left is always very considerable. Germany: Bavaria

Recently, since the reorganization of the agricultural department in Bavaria, agriculture, and, consequently, soil improvement has taken a great step forwards.

In 1910, 1696 partial ameliorations were carried out by the agricultural offices over an area of 5160 hectares (1); in 1909 improvements only affected 3871 hectares. The improvements made in 1910 were carried out in the ratio of 74 % meadows and grazing lands, and 26 % arable land.

These improvements comprised irrigation, drainage, clearing of moor lands etc. The cost amounted to 1 542 197 marks, but the

(1) 1 Hectare = 2.4711 acre 1 Mark = 11 3/4 *d.*

value of the land was increased by 3 614 837 marks. Besides these, other works were in hand for the reclamation of a further area of 13 944 hectares.

Bavarian agriculture will be considerably benefitted by these undertakings, which cannot but tend to lower the price of food.

2386 C. J. COOKE. (Brit. Consul). **Administrative Measures for Promoting Agriculture in Greece** (1). (Report for the Year 1910 on the Trade and Agriculture of the Plraeus and District). — No. 4750 *Annual Series. Diplomatic and Consular Reports. Greece.* 22 pages. London, July 1911.

Greece A Ministry of Agriculture and Commerce was recently established. Much benefit is expected from improved administration of agri-

(1) Greece is mainly an agricultural country. The cultivated area extends to about 5 563 100 acres; of which about 1 112 000 acres are under cereals, 1 200 000 fallow, and 2 025 400 covered with forest; there are, besides, about 5 000 000 acres under pasture and 3 000 000 acres of waste land. By the draining of Late Copais, an area of about 53 000 acres has been acquired for agricultural purposes. Irrigation and drainage canals, farm roads, and buildings are being constructed, tree-planting is undertaken, and the breed of cattle is being improved.

While there are a few large proprietors in Greece, the land is to a large extent in the hands of peasant proprietors and *métayer* farmers. On the whole, agriculture is in a backward state, though the soil is of unusual fertility. The cereals grown are wheat, barley, rye, maize, mezlin. The most favoured and best cultivated crop is the currant, which covers vast districts. The annual yield is now about 150 000 tons, which far exceeds the annual export. In 1905 a charter for 20 years was granted to a « Privileged Company for the Protection of Currant Production and Trade » which, under an elaborate arrangement with the Government, is required to purchase currants at fixed prices. For 1908 the crop was estimated at 185 000 tons.; the exports in 1908-1909 amounted to 83 000 tons. The crop of valonia (the acorn cup of *Quercus aegillops*, used in tanning) was, in 1908, 4 000 tons; artificial substitutes have superseded valonia, which will soon cease to be an article of trade. The yield of tobacco in Greece in 1908 was about 5 465 metric tons. Silk culture is carried on in Messenia; in 1905 the export of cocoons amounted to the value of about £40 000. From Thessaly in 1907, 2 793 cwt. of cocoons (valued at £59 847) were shipped. The wine, olive, orange, lemon and figgrowing industries are important. The export of wine from Corfu in 1908 amounted to about 5 000 000 gallons; of olive oil the yield was 3 360 000 gallons. There are in Greece 100 000 horses, 360 000 cattle, and 2 900 000 sheep. (*Statesman's Yearbook for* 1911, pp. 927-928). (*Ed.*).

cultural affairs in Greece. Agriculture is being benefited also by the work of the Agricultural Society of Greece. To improve the native breed of horses, stallions belonging to this society have been stationed at different centres throughout the country ; agricultural experimental stations have been established ; a programme has been arranged for having the rudiments of agriculture tanght in the village elementary schools : and the spraying of vines, etc. for protection against mildew is being promoted by the sale, at a low price, of high-class British sulphate of copper, the distribution being made through the medium of the monopoly offices throughout the country.

Agricultural Production in the Peloponnesus. (Report of the Italian Consul at Patras). (Produzione agraria del Peloponneso). — *Bollettino del Ministero di Agricoltura Industria e Commercio*, Vol. II, Serie B., Fasc. 4°, p. 101-104, Roma, 15 Agosto, 1911. 2387

The Peloponnesus is a mountainous district, essentially agricultural in character. Several important crops are raised in the sea coast provinces ; first and foremost come currants, which are the chief economic resource of the country ; then oil, wine, gallnuts, figs, tobacco, and limes (*citrus medica*). Sheep and goats are plentiful in the Peloponnesus. Greece: Peloponnesus

The annual currant crop is reckoned on an average at from 170 000 to 180 000 tons, of which two thirds are exported to England, Germany, Holland, the United States, and Australia. The Peloponnesus produces about half of the whole Greek crop.

The output of wine is declining to such an extent that the Government has abolished taxes on vineyards, so as to encourage this crop. The wine is resinous (1) and is consumed almost all in Greece.

About 2 350 tons of gallnuts are produced each year ; they are exported to Austria, Germany and Italy. Calamata is the principal port for exporting dry figs.

The annual tobacco crop of the Peloponnesus is estimated at 500.000 « oke » (1 « oke » = 1.280 kilos or 2.821 lbs).

From 700 to 800 tons of limes are also gathered, and about 1 200 000 « oke » of liquorice root.

1) See Abstr. 1257 *Bulletin* : April 1911.

2388 BERNER and SIDNEY CHURCHILL (Brit. Consuls at Naples and Bari). **Agriculture in Apulia, Italy.** — *Diplomatic and Consular Reports*, No. 4720, 27 pages. London, July, 1911.

Italy : Apulia

The most important work in South Italy is that connected with the provision of drinking water for the Apulian provinces. The contract for this work provides for its completion in 1916. The canalisation was to extend to about 3500 kilometres (1). There is some prospect of the Government itself assuming the continuation of the work, which, when completed, should give 1100 gallons of water per second.

The principal commodities exported from Apulia are olive oil, almonds and wine. Other articles are locust beans, figs, canned tomatoes, brown mustard, aniseed, fennel seed, etc.

Sardine packers, both French and Norwegian, have as usual been the largest oil buyers in Apulia.

The normal oil crop is of 60 000 tons yearly.

The 1910 vintage was fairly satisfactory in point of quality, but small as regards quantity. It did not exceed one-third of a normal output in Apulia, and there were about 30 000 000 hectolitres in all Italy as against 50 000 000 hectolitres in 1909.

Exportation, however, was unusually active, owing to the short crops in France and Germany, as Italian wines were largely used abroad in substitution of French and German growths.

The chief outlets for Bari almonds are Germany, Austria-Hungary, and the United States.

Tomato pulp and peeled tomatoes are made, and nearly the whole production is absorbed by the United Kingdom.

2389 SALAS AUTÓN. **The Present and Future of Agriculture in Spain**. (Presente y porvenir de la Agricultura Española). — *Progreso*, Año VI, No. 64, pp. 449-450. Barcelona, September, 1911. (2)

Spain

Spanish exports of vegetables and fruits are stated in pesetas (3) for 1908, 1909, and 1910 as follows:

	1908	1909	1910
Fresh fruit	70 202 048	75 028 122	77 697 731
Dry fruit	51 243 370	58 813 946	53 813 302
Vegetables	22 144 380	20 552 717	23 315 267
	143 589 798	154 394 785	154 826 300

(1) 1 kilom. = 0.6213 mile.

(2) For fruit culture in Spain see pp. 281, 285 of *Bulletin* for December 1910; and Abstr. 1193, April 1911. For stock-breeding see p. 122 *Bull.* Nov. 1910. For development of agriculture in Spain see p. 187 *Bull.* Dec. 1910 and Abstr. 1083 *Bull.* April 1911; Abstr. 2034 *Bull.* July 1911. (*Ed.*).

(3) 1 peseta = 7 ½ d.

The productive potentiality of Spain is, however, vastly greater, and these figures will be greatly increased when the necessary irrigation works have been completed and supplemented by improved means of communication, and lower railway rates for carriage of food-stuffs.

Spain should follow the example set by England in introducing scientific methods of farming. The agricultural output of the Channel Islands is very high, though the soil and climate is far from being as favourable to fruit production as that of Spain.

Syndicates of small and large land-owners should be formed in Spain to develop agriculture by exploiting large tracts of territory.

A plentiful supply of capital would not alone allow of the formation of big estates, but it would then be possible to undertake the acclimatization of exotic plants which would be very profitable.

There is a great need of improving the system of preparing and packing exports, and of providing more rapid transport.

Along with the development of orchards and market gardens stock breeding and especially the cheese industry, which is one of its by-products, should not be neglected.

GAISFORD (Brit. Diplom. Rep.). **The Agricultural Situation in Portugal.** — *Portugal. Diplomatic and Consular Reports.* No. 4688, pp. 1-31. London, June, 1911. **2390**

Portugal is essentially an agricultural country, the soil is rich, the climate excellent, but at present she is capable only in exceptional years of supporting her population. Portugal has 46 per cent. of fallow land, which, in Europe, is only exceeded by Norway. Three-fifths of the inhabitants are engaged in agricultural pursuits, and were a greater proportion of the soil brought into cultivation the country could support a far larger population, and at the same time the emigration of persons unable to find employment would to a large extent be reduced. What is required is the institution of easy means of transport by road and rail, the development of irrigation, some system of land banking, and the planting of trees to supply the deficiency caused by the exportation of timber. **Portugal**

In fact, efforts are being made in this direction, up-to-date methods have been introduced, schools of agriculture have been founded, soil tests have been carried out, and attention devoted to the study of fertilizers. The result is beginning to show, especially in the Alemtejo district, where large tracts of fallow land have been converted into good grain-growing areas.

In past years, heavy sums have been expended to supply the wheat shortage, and not so long ago, as much as 30 000 000 francs (£1 200 000) left the country on this account in one year.

Oranges and lemons are no longer a paying trade, the prices paid in the principal foreign markets being too low. Grapes are largely exported to France for the production of wine, and an increasing trade is being done with Germany. As regards grapes for the table, a much better trade could be done, if more care were bestowed on the selection and packing of the fruit. The trade in figs, almonds, and chestunts is stationary, and the same can be said of that in onions, tomatoes, potatoes and locust beans.

The dried fruits trade should be remunerative for Portugal, but only the Elvas plums are exported to any extent. The production of butter and cheese is increasing and the quality shows marked improvement.

As regards cattle, it may be said that if the efforts which are being made, by improved irrigation and afforestation, to create green pasture during the summer drought are successful, a marked increase of cattle-raising, and with it of dairy produce, can be looked for. Recently the restrictions on the importation of cattle and frozen meat have been removed, though they may be reimposed in certain eventualities.

Wine is Portugal's most valuable asset, the value exported being normally over 50 000 000 francs (£2 000 000) per year. The actual production is estimated at as much as 7 000 000 hectolitres (1). In past years the export greatly increased to Germany and Switzerland and it is anticipated that France will buy largely this year. The efforts made by the Government to prevent imitations of Port and Madeira are maintained, and are having effect in stimulating the production and sale of these justly famed wines.

The distilling industry has shown development of late in Portugal, and brandy of good quality is produced ; the annual export is about 2000 hectolitres, the greater part going to Brazil and Russia (2).

(1) A hectolitre = 22.0096 gall.

(2) In 1909 the value of cork exported from Portugal amounted to 3 144 007 milreis, and that of manufactured cork to 996 930 milreis. *The Statesman's Year Book for 1911*, p. 1118. 4,5 milreis = £1. (*Ed.*).

Agricultural Development in Transcaucasia. Reports of the Austrian Consuls at Tiflis and Batum. (Wirtschaftliches aus Transkaukasien). — *Oesterreichische Monatsschrift für den Orient.* No. 8, S. 126, Wien, August, 1911. 2391

The area sown to cotton at Karajhasi in 1911 exceeded by 200 dessiatines, (1) or 539.94 acres, that sown in 1910; cotton was grown on a total area of 8.000 dessiatines or 21597 acres at Mugabschen. An experiment station for cotton cultivation has been opened at Axtafa. 98 785 dessiatines or 266 690 acres, are cultivated as vineyards in Transcaucasia. Russian Empire: Transcaucasia

In 1910 there were 67 cheese-factories in the Caucasus, mostly in Swiss hands. The Caucasian Swiss cheese is said to be richer and better than the original type (2).

The last tea-harvest in Transcaucasia, amounting to 185 000 *poods*, or 7 400 000 lbs was very satisfactory ; and nearly all of it was sent to other parts of Russia.

Also the bamboo cane plantations in South Western Transcaucasia were very successful last year ; but as yet the yield is too small for anythimg but home trade.

P. J. Mc. Gregor (Brit. Consul.). **Trade and Agriculture of the District of Erzeroum in 1910.** — *Diplomatic and Consular Reports.* No. 4734, *Aunual Series, Turkey,* pp. 20. London, June, 1911. 2392

The principal exports of agricultural products from Erzeroum, Bitlis, Diarbekir and Van duriug the year 1910 were as follows in pounds sterling : almonds, 13 300 ; beeswax, 2 470 ; butter, 53 200; cattle, oxen, etc. 59 400; sheep etc. 345 000 ; horses and mules 12 000 ; cocoons, 2 300 ; raw cotton, 11 500 ; eggs, 1 500, dried fruits, 5 700 ; furs, 28 450 ; galls and dyes, 4 450 ; gum, 7 500; goat and lamb skins, 49 000 ; hides and skins, 33 400 ; leather, 2 000 ; linseed, 1 200 ; mohair, 14 800 ; pasdirma (jerked beef), 17 000 ; pulse, 3 000 ; rice, 20 000 ; raw silk, 10 500 ; silk goods, 30 000 ; timber, 15 000 ; tobacco, 12 500 ; vallonea, 3 000 ; walnut logs 4 050 ; wheat 12 000 ; wool 69 150. Ottoman Empire: Armenia

(1) 1 dessiatine = 2.6997 acres.
1 pood (40 lbs.) = 0.3224 cwt. = 0.0161 tons. (*Ed*).

(2) See Abstr. No. 764 *Bulletin.* March 1911. (*Ed.*).

Agricultural implements. — With a view to encourage cultivators in the use of improved appliances, the Agricultural Department imported from Austria-Hungary and Germany about £ 400 worth of agricultural implements, to be sold at cost price, the expenses for freight, etc., being paid by the Department. Half of the above were sold, and the proceeds are to be devoted to further purchases. Besides the above, merchants are now importing agricultural implements from Russia and the United States, and it is believed that the demand will increase, especially for those imported from America.

2393 C. Gorrini. (Italian Consul at Trebizond). **Agriculture, Industry and Commerce in the Vilayet of Van in** 1910. (Agricoltura, industria e commercio nel Vilayet di Van nell'anno 1910). — *Bollettino del Ministero di Agr. Ind. e Comm.* Anno X, Vol. II, Serie B, Fasc. 3, pp. 77-79. Roma, 1 Agosto, 1911.

The territory of the vilayet of Van is very fertile, but the lack of roads and the disturbed state of the country retard agricultural development.

The principal crops are wheat, barley, rye, flax, tobacco and millet seed. In 1910 the following estimates are given for the crops in quintals (1) (of 100 kg.). wheat 697 000 ; barley, 22 000 ; rye, 280 000 ; millet, 50 000 ; flax, 12,000 ; tobacco, 5,130. Tobacco is grown in the « cazá » of Castan Chiatak and Schadinan.

Ottoman Empire : Armenia

The most important local industries for utilising agricultural products are tanning, and carpet and textile factories. Tanning was recently introduced and is making headway ; in 1910 some 10,000 buffalo, ox, sheep and goat hides and skins were tanned. « Gegim » and » Kilim » carpets (smooth pile) are made by the Kurds in the vilayet. The » Kilim » carpets of Schandinan are the best known and the annual output is valued at 37 500 frs. (£. 1500) (1910). Cotton and goat-hair textiles are woven ; the latter are exported to the vilayet of Bitlis, and to Erzeroum and Constantinople for an annual value of about 18 400 frs. (£. 736).

In 1910 the vilayet of Van exported « Tiftik » (made of mohair and sheeps wool) 184 000 fr. (£.7 360); « Tiftik » (of pure mohair 69 000 fr. (£.2,760) ; lamb's wool 36 800 fr. (£.1 472); goat's hair and sheep's wool, 11,800 fr. (£.472); buffalo and calf hides, 23 000 fr. (£.920) fox and weasel skins 148 500 (£.5 940); sheep's fat, 158 000 fr., (£.6 320); horses, donkeys, mules, 51 000 fr. (£.2 040); goats and sheep, 1 182 540 fr. (£.47 301) ; linseed oil, 48 000 fr. (£.1 920); walnuts, 71 500 fr. (£.2 860) ; wax, 42 000 fr. (£.1 680) ; barley and wheat, 23 500 fr. (£. 940).

(1) 1 Quintal = 220.46 lbs.

G. E. HUBBARD (Brit. Consul). **Agricultural Development and Olive Production in Crete** (1). — *The Board of Trade Journal*, vol. LXXIV. No. 769, pp. 388-389, London, August, 24, 1911. 2394

The Department of Agriculture is busily employed in teaching the people the elements of agriculture and arboriculture. The system of pruning the olive trees is being introduced for the first time, and though the peasants show the greatest reluctance to abandon their crude ancestral methods, a large percentage of them have now applied for an employé of the Department to prune their trees. This is of real importance, as a scientifically pruned tree will bear fruit regularly every season. Crete

It is expected that the annual supply of olive oil will become much more regular as the system of pruning and dressing the olive is more generally adopted, A few large presses (mostly of French make, and costing about £100 each) have been installed lately, and iron presses of local manufacture are supplanting the old-fashioned wooden ones; but the process of extracting the oil remains very imperfect, and the residue still contains enough oil to repay repressing by the foreign plant established at Canea for that purpose. No improvement has taken place in the method of gathering the fruit, which is still knocked off the boughs with sticks.

The number of olive trees in Crete is officially given as 10 000 000, yielding annually an average of 2 000 000 cwts. of olives, from which 400 000 to 500 000 cwts, of oil are extracted; of this amount about 300 000 cwts. are consumed at home (including 60 000 cwts. used in the manufacture of soap), and 200 000 cwts. are exported.

Attention is also being given to the making of new roads (of which some 39 miles were made in 1910), and work has been begun on a road to connect the three northern ports of the island. Finally, a proposal to build a railway (the first in Crete) was voted by the last Assembly. The line, if constructed, will connect Candia with the plain of Messara, a well-watered and fertile plateau of about 75 square miles. This plain has been very imperfectly cultivated till now on account of the great cost of carrying produce to the centres of consumption, or to the coast, the only means being pack horses or mules; but a splendid corn-growing area would be opened up by the railway, capable probably of sufficing for the needs of the whole population, who at present import at least two-thirds of the grain consumed.

(1) Cf. Abstr. 1606 *Bulletin*: June 1911. (*Ed.*).

2395 **Crop Conditions and Prospects in Smyrna Districts.** — *The Board of Trade Journal.* Vol. LXXIV, No. 768, pp. 343-344. London, August 17, 1911.

Ottoman Empire: Asia Minor

The cotton crop for the 1910-11 season amounted to 32 000 bales. The coming crop is estimated at 35 000 bales. The local consumption amounts to some 20 000 cantars (1 cantar = 125 lbs). The last crop of cotton seed amounted to 9 600 000 okes (1 oke = 2.8326 lbs.) and the coming crop is estimated at 10 500 000 okes. Nearly 180 000 denums (45 000 acres) were taken up for planting with tobacco, 50 to 60 per cent. more than last year. However owing to the adverse weather conditions, the new crop is only expected to yield between 4 500 000 okes and 5 000 000 okes, as compared with 5 250 000 okes in 1910 and 2 000 000 okes in 1909.

The coming crop of figs is estimated at about 22 000 tons, as against 29 000 tons last year. The decrease is attributed to the damage done to the trees by last winter's severe frosts.

This season's yield of sultanas is estimated at from 30 000 to 35 000 tons as against 18 000 tons last season, and a normal crop of over 40 000 tons.

The 1910-11 olive oil crop in Crete and Mitylene was very poor; there was a bumper crop in the edible olive oil district of Aivali, and a fair crop at Adramytti and in the vilayet of Aidin. The 1909-10 Aivali crop amounted to some 2 800 000 kilogs. (1 kilog. = 2.2046 lbs.), of good quality; this year's crop is estimated at 5 950 000 kilogs. At Mitylene the olive crop this season yielded only 650 000 lainia (about 5 470 tuns) of oil, as against 1 500 000 lainia (about 12 600 tuns) in the 1909-10 season.

The Valonea trees (*Quercus Aegillops*) have been harmed by excessive frosts during last winter and spring, and consequently both the quantity and quality of the crop are believed to have suffered considerably. A crop of some 950 000 cantars is expected.

2396 HARRIS (Brit. Consul). **Agricultural Production in Tripoli, Turkey. Report for the Year 1910 on the Trade and Commerce of Beirût and the Coast of Syria.** — *Diplomatic and Consular Reports,* No. 4746, Annual Series, pp. 8-9, London, July, 1911.

Ottoman Empire: Syria

In many respects, the past year has been commercially the best in the history of this port and district.

The new railroad from Tripoli to Homs connected with the romises to be the making of the district

Emigration is causing such an annual decrease of the agricultural population that it is found impossible to carry on agriculture without the use of modern machinery, There is consequently an increasing demand for the latter, which, however, at the present state of development of the people, must be of the simplest kind, and at the same time cheap.

Silk. — The silk crop was better than that of 1909, which, however, was good. It is nearly all of the very best quality, and is sold to French firms.

Oranges and lemons. — The crop was good and considerable quantities were exported to Russia, Germany, Italy, Austria-Hungary and the United Kingdom.

Eggs. — Almost 4 000 000 eggs were exported during the year.

FONTANA (Brit. Consul). **Turkey. Report for the Year 1910 on the Trade of the Aleppo Vilayet.** — *Diplomatic and Consular Reports*, No. 2741, Annual series, p. 7. London, July, 1911. **2397**

In consequence of abnndant rains duriug the winter of 1909-10 and the succeeding spring, the harvest of wheat, barley, oats and cereals in general was most abundant, being about double that of ordinary years, and pasturage was excellent. Flights of locusts covered the country when the crops were mostly reaped, and not very much damage was done to grain, although vegetable gardens suffered heavily; £T 20 000 (1) were afterwards spent by the Aleppo government in the destruction of locust eggs. Wheat, barley, oats, dari seed, lentils, peas, vetches, cotton, pistachios, liquorice root and tobacco are grown, and the animal produce consists of oxen, sheep, camels, horses, skins, goats' hair, wool and butter. **Ottoman Empire: Aleppo**

The value of the cattle exported through Alexandretta during 1910 showed an increase of £T 77 000 on that of 1909.

There was an outbreak of anthrax in the neighbourhood of Alexandretta, and of rabies at Aleppo in April, 1910.

(1) £T 11 = £10 approximately.

2398 SAMSOM. **The Agricultural Production of Corea.** — *Diplomatic and Consular Reports.* No, 4676, pp. 1-21. London. June 1911 (1).

The total area under cultivation in Corea is said to be 5 635 000 acres. Rice lands are estimated at 1 744 000 acres, giving in 1909 a harvest of 37 285 000 bushels. With proper use of fertilisers and better irrigation, there is no reason why two crops should not be obtained from the wet fields, as in Japan, and why the harvest should not reach 50 000 000 bushels in time.. The proposal now mooted to allow Corean rice to enter Japan free of duty. will if carried into effect, no doubt assist the exporters, and the growers indirectly, by giving them a better hold on the Japanese market, and a control of prices.

Japan Corea

The cotton growing industry is one on which great hopes are set and considerable efforts are being made to foster it. A Cotton Cultivation Association is devoted to encouraging the cultivation of the Upland species of American cotton.

It produced in 1909 about 400 000 lbs. from 1 000 acres, and by 1911, will own plantations covering 7 500 acres.

The ground available for cotton in Corea is estimated at 1 300 000 acres, of which it is said that 600 000 acres will be re-planted with Upland cotton by 1917.

In sericulture, live-stock farming and tobacco planting, efforts are being made to improve native methods and materials by the establishment of experimental stations, grants of imported stock etc.

The following figures show the value of the agricultural export of Corea :

Rice	£ 640 830
Beans	» 584 510
Wheat	» 29 455
Hides and Skins . . .	» 102 560
Cattle	» 64 725
Ginseng	» 18 350
Wood	» 9 600

2399 **The Economic and Agricultural Condition of Karafuto.** — *Journal of the Royal Society of Arts,* No. 3059, pp. 851-852. London, July 7, 1911.

Japanese Empire: Karafuto (Sakhalin)

Of the industries of the Island of Karafuto (Sakhalin), fishing has from ancient times been the most important and developed.

(1) See this *Bulletin:* May, 1911; No. 1339.

The growth of the herring fishery hasof late been specially marked; cod fishing is carried on to a considerable extent.

Crab fishing has developed remarkably; the crabs are tinned and chiefly exported to America. About 10 000 cases of tinned crab were poduced in 1909.

An experimental fish farm has been established on the western coast, where investigations and researches of various kinds are being carried on.

Investigation has shown that there are many tracts suitable for cultivation and pasturage, and that both soil and climate are favourable.

Agricultural settlers have been established in suitable localities, and domestic animals and various kinds of seed have been provided for them. At present the chief products of the island are wheat, barley, oats, rye, peas, potatoes, hay and vegetables.

The forests are untouched and of an extent unequalled in other parts of the Japanese Empire. Coal is abundant and of good quality (1).

STEWART. **Production and Export of Agricultural Products in the Dutch East Indies.** — *Diplomatic and Consular Reports*, No. 4670, pp. 1-40. London, June 1911. **2400**

In Java the area under sugar cultivation has been further increased, and the weather in most parts of the cane growing districts has been favourable, with the result that the 1910 crop is estimated to be nearly 37 000 tons in excess of its predecessor. **Dutch East Indies**

The latest official statistics show the sugar production of the past three years to be as follows:

		1908	1909	1910
Planted Area	Acres	289 744 —	301 134 —	312 000 —
Total production . .	Tons	1 241 885 —	1 241 726 —	1 280 000 —
Production per acre .	Tons	4.28	4.12	4.10
Mills working	—	177 —	181 —	182 —

(1) See page 190 *Bulletin*, for December, 1910.

The following are the coffee productions in tons for the past three years :

	1908	1909	1910
Government:			
Arabica	4 225	1 291	1 400
Liberia	765	669	550
Robusta	—	—	9
Private:			
Arabica	10 736	4 591	4 475
Liberia	3 015	6 067	4 075
Robusta	—	639	1 830

The production of Java-grown rice continues to increase, the export figures for the past three years being :

1908	about tons	21 800
1909	» »	53 100
1910	» »	55 857

The rice exported is of superior quality and too high priced for native consumption.

Teak exports during 1910 amounted to 46 864 cubic metres. (1) Exploitation of the forests by the Forestry Department is being continued, the timber being marketed in the shape of rough logs. A few new forests were let to private contractors during 1910.

The efforts of copra exporters to bring about an improvement in quality have had little effect so far, but it is reported that the Netherlands Indian Government intend taking the matter in hand, as it has been found that the practice followed by the natives of plucking unripe nuts is having a very bad effect upon the trees. The steadily increasing demand for copra and the high prices obtained for the article in recent years, have attracted the attention of investors, and ground suitable for the cultivation of cocoanuts is being inquired for.

The year 1910 has been a highly satisfactory one for Java tea planters. Production has increased by fully 10 per cent.

The Kapok exports during 1910 totalled about 8200 tons, and about 1700 tons of various other fibres were exported, being more than double the quantity shipped during the preceding year.

Oil seed shipments have been as follows :

Ground nuts	Tons	18 000
Castor seeds	»	900
Kapok seeds	»	10 000

(1) 1 cub. metre = 1.31 cub. yd.

Tapioca exports, both of flour and roots, show a considerable falling-off as compared with those of the past few years.

In Java are 157 estates planted with rubber, with an area of 42 000 hectares of planted rubber, principally *Hevea*.

A British firm of rubber engineers are constructing large numbers of temporary and permanent rubber factories.

An inferior variety of wild rubber is that known as Jelutong. This product is collected by natives in the forests of Sumatra and Borneo, and is obtained from trees belonging to the *Dyera* and *Alstonia* families. As the method of collection employed by the natives is extremely destructive to the trees, the Government of the Dutch East Indies has found it necessary, in order to prevent their extermination, to impose restrictions on the collection of Jelutong (1).

Macassar (Celebes) has exported in 1910 :

Coffee	lbs.	2 402 304
Copra	Tons	31 168
Maize	»	4 674
Gum Copal	»	2 946
Rattan	»	9 694
Hides	»	881
Kapok	»	305
Sandalwood	»	794
Birds of paradise skins	» to the value of £.	21 310

On the East Coast of Sumatra the 1911 tobacco crop is being cultivated on about 4000 acres less than in 1910.

Large areas of rubber have recently been interplanted with *Robusta* coffee, but this cultivation in many cases is not proving so successful as was originally anticipated.

The total area planted with rubber in the East Coast of Sumatra is estimated at 80 000 acres, of which over 70 000 acres are filled with *Hevea Brasiliensis*.

MOSER. (United States Consul at Aden). **Agriculture in Sokotra** (2). **2401**
— *Oesterreichische Monatschrift für den Orient*, No. 8, S. 124-125, Wien, August, 1911.

That Sokotra is a land but little known is due to its want of good **Sokotra**
harbours. It is mountainous but very fertile. Rare trees grow in

(1) Abstr. 219 *Bulletin* for July, 1911. (*Ed.*)

(2) The island of Socotra off the coast of Africa is under British protection, and the Kuria Muria islands, off the coast of Arabia, are attached

its forests, such as the *Dendrosicyos*, (1) the *Dracaena* (2) and three varieties of balsam-yielding trees. All these trees have huge roots which enable them to draw sufficient nourishment even out of dry soil.

The mountains are almost rainless, except from May to September, when the soil is thoroughly saturated.

The natives on the coast support themselves by fishing and cattle-raising. In the mountains, a little dourah, cotton and tobacco are cultivated. Sheep, goats, donkeys, camels, and a fine race of oxen are bred there, very different from the Arabian and African.

The methods of exploiting the balsam-yielding trees and the *Dracaena* are very primitive. The latter is used in the preparation of dyes, and is exported in small quantities as well as the balsam. The most important export is « ghee », a kind of butter made from goat's milk. (3) Balsam is extracted by making incisions in the trees in May, at the beginning of the wet season. It is inferior to that which comes from Hadramaut and Somâli Land ; which latter is the best on the Aden market.

The cattle are fine tawny coloured animals without the hump of fat which is peculiar to the Indian variety. The cows give abundant milk with large fatty content. They are admirably fitted for dry, hot countries, and the British Government is importing them for the Indian army. Herds of wild asses are to be found in certain parts of the island.

to Aden. Area of former, 1382 square miles. Population about 12 000, mostly pastoral and migratory inland; fishing on the coast. The island came under British protection in 1896, by treaty with the Sultan. Chief products: dates and various gums: sheep, cattle, and goats are plentiful; butter is exported. *The Statesman's Year-Book for 1911*, p. 101. See also : H. O. FORBES, *The Natural History of Sokotra* and *Abd-el-Kuri*, Liverpool, 1903. (*Ed.*).

(1) Genus belonging to the *cucurbitaceae*. The *Index Kewensis* mentions two species : *D. Jaubertiana* Baill. of tropical Africa, and *D. socotrana* Balf. of the Island of Sokotra. (*Ed.*).

(2) « Dragon's blood in drops » known also under the name of Bombay or Zanzibar dragon's blood, is an inferior resinous substance. This product is not always the resin of *Daemonorops;* it is often a resinous exsudation af arborescent Liliaceae of the genus *dracoena*, of which two species, *D. schizantha* Baker, and *D. cinnabari* Balf. f. are the chief sources of the false dragon's blood. See, H. JACOB DE CORDEMOY, *Les plantes à gommes et à resines*, pp. 311-312. Paris 1911. (*Ed.*).

(3) « Ghee » or « ghi », clarified butter: that is, butter that has been heated for about twelve hours. Goat's milk ghee is of inferior quality. WATT, *The Commercial Products of India*, p. 478. London. 1908. (*Ed.*).

United States Agricultural Export Increased. — *Weekly Globe and Canada Farmer*, No. 3237, p. 8. Toronto, July 26, 1911. 2402

The farmer and the manufacturer of the United States shared about equally in the remarkable growth in exports which characterised the fiscal year just ended. The total increase in exports was $ 304 000 000, as compared with the preceding year, being a larger gain than ever before shown in a single year of export trade manufactures. United States

Cotton is the most important item in the exports of products of agriculture, the value exported during the year being $ 585 000 000 by far the largest total ever shown in the cotton export trade, against $ 450 000 000 in 1910 and $ 481 000 000 in 1907.

Meat and dairy products show a total of approximately $ 150 000 000 against $ 131 000 000, last year, but materially less than in certain earlier years in which the total ranged as high as $ 202 000 000 in 1907 and $ 211 000 000 in 1906.

Flour amounted to approximately $ 50 000 000 in value, against $ 47 500 000 last year, but much less than in certain earlier years, the high record in flour exports in 1893 showing a total of approximately $ 75 000 000.

De Salazar (Spanish Consul at S. Francisco). **Progress of Agriculture in the State of Oregon** (1), — *Memorias Diplomaticas y Consulares*, No. 227, pp. 1-24. Madrid 1911. 2403

The climate of Oregon is very variable. In this State, which contains no less than 37 050 000 acres of arable land, agriculture is United States: Oregon

(1) Oregon is one of the semi-arid States. In the river valley west of the Cascades there is a good rainfall and almost every variety of crop common to the temperate zone is grown. East of the Cascades, lack of rainfall has been to some extent compensated for by irrigation by private companies. Work has been begun on Federal irrigation schemes covering 20 440 acres in Oregon alone, to cost 1 200 000 dollars, while projects are under consideration for the irrigation of 172 000 acres more in California and Oregon. The forest reserves comprise timber-land of 6 072 550 acres under the U. S. fores service; the exports by sea of timber, in 1908, amounted to 385 072 000 feet B. M. The leading crops are wheat (16 377 000 bushels in 1909) and hay. Oats, barley, and flax-seed are grown to some extent. Potatoes, sugar beet, and especially hops are important crops. Fruits are grown, especially plums and apples. There is an active live-stock industry. Horses on Jan. 1, 1910 numbered 308 000; milk-cows, 174 000; other cattle, 698 000; sheep, 2 581 000; swine 267 000. In 1909, the wool clip yielded 15 725 000 pouuds.

The Slatesman's Year-book for 1911, pp. 507-508. (*Ed.*).

gaining daily in importance. In the western part, which is not so dry as the rest, all the crops of the temperate zone are raised. The large estates are being subdivided, and the land owners have applied to the government for assistance in the carrying out of 464 irrigation schemes representing an outlay of about £60 000 000.

Oregon produces one sixth of the total output of timber of the United States. In 1909 about 1 750 000 000 cub. ft. were cut, chiefly spruce, pine, red and white cedar, ash and maple.

The returns from poultry keeping amounted in 1909 to about £1 000 000. The breeds most frequently met with are " White Leghorns ", " Minorcas ", and " Plymouth Rocks " for the table.

The Oregon pears, strawberries and cherries are highly esteemed.

The live stock, in the State is estimated at about £3 600 000 exclusive of horses.

The land under cultivation is valued at £13 842 000 and that still lying follow at £33 241 000. The total agricultural produce not including dairy products, in 1909 is set down at £23 583 000.

2404 T. ERSKINE (Brit. Cons. at St. Louis). **Agriculture in Missouri, Oklahoma, Kansas, Kentucky, Arkansas and Tennessee States.** — *United States Diplomatic and Consular Reports*, No. 4711., pp. 28. London, July, 1911.

United States: Missouri Oklahoma Kansas Kentucky Arkansas Tennessee

There are 276 081 farms in the State of Missouri; the acreage occupied, 34 516 000 acres, shows an increase of 10 000 acres in ten years.

The methods of farming are improving, more care being taken with cultivation and seed, but there is still much room for improvement on all but the very best farms, and in the case of the larger farms the necessary labour is difficult to get, as everyone wants it at the same time. In former days much of the land was scratched and sown year after year with the same crop; ploughing was shallow, there was no selection of seed, and weeds were allowed to increase until the return was so small that it no longer paid.

Then the farmer moved west to other open land and did the same.

Missouri has 2 439 600 acres, Arkansas 5 912 300 acres and Tennessee 639 600 acres of land which is subject to overflow; this with a great deal more swamp land, can be reclaimed by ditching and embankments.

As male calves are of little value, they are rightly sold; but, unfortunately, thousands of heifer calves, many of them Hereford,

Shorthorn and Angus, are slaughtered for veal, and the result is that milch-cows are becoming difficult to find.

The hog-packing season is divided into summer and winter in St. Louis. In 1910 705 368 hogs were killed in the winter season. Of the 30 000 000 hogs marketed in the United States, 24 162 000 were sold in the Western States.

Although 50 000 fewer sheep were received at St. Louis market, 725 000 head passed through the yards, and 695 143 were slaughtered.

The light bus horse is getting much scarcer, as the tendency is to breed to Percheron, Clyde, and Shire stallions or grades.

Missouri is a great poultry state, but notwithstanding the large output, it is almost entirely used locally and none is available for export.

The acreage sown to maize is steadily increasing, as it is being more and more grown in the Southern States, as a rotation crop with cotton, to counteract the effect of the boll weevil, and instead of tobacco, of which there is danger of an over-production. The United States Department of Agriculture, as well as the officials of the different States, are doing much to encourage intelligent growing of maize, by advocating tests of seed and choice of variety suitable to the local conditions.

Missouri with over 100 000 wheat acres less than the previons year, produced over 25 000 000 bushels of wheat, while Kansas, with a decrease of acreage. produced 62 000 000 bushels.

Missouri had 7 500 acres under tobacco, producing 7 875 000 lbs ; Kentucky 470 000 acres, 381 024 000 lbs; Tennessee 85 000 acres, 64 600 000 lbs ; and Arkansas 900 acres, 585 000 lbs.

In 12 years the cotton crop has varied very little ; in 1904 it was 13 000 000 bales, the highest; and in 1909 the lowest, 10 386 209 bales.

The United States Department of Agriculture is experimenting wth Egyptian cottons, and advising farmers as to the growing of this kind (1).

Scobell, Graham and Holms. (British Consuls in Mexico). **Agriculture in Chihuahua, Durango and Guadalajara. (Mexico).** — *Diplomatic and Consular Reports.* No. 4742, pp. 1-17. London, July, 1911. **2405**

Agriculture is far from having reached a high state of development in *Chihuahua*. **Mexico Chihuahua Durango Guadalajara**

(1) See Abstract 1405 *Bulletin* May 1911. (*Ed.*).

The chief cereals grown are maize, wheat, and beans. Cotton is grown in the southern part of the State. Large quantities of maize are annually imported from the United States.

The stock raised consists chiefly of cattle, sheep and goats. This industry is controlled for the most part by a few large landed proprietors.

There are several British subjects interested in stock-raising in different parts of the State. Cattle always command a good price in the markets of the United States.

In *Durango*—in the year 1910—the corn, beans and chicle crops were below the average. Last season's cotton crop was a failure for the Durango planters.

The *Guayule* (1) industry continues to be most profitable. There are five factories in Torreon and Gomez Palacio with an annual output of about 20 000 000 dollars; the extraction of rubber per gross weight of material treated is 12 to 14 per cent. Unfortunately the end is almost in sight. As most of the gum is in the roots, the plant has to be torn up by the roots, which is ruthlessly done. An inspection of land that has been cropped will show that it is not reproducing to any extent. Reproduction from seed in the dry calcareous desert, that forms the natural habitat of the *guayule*, will need many years.

Experiments on irrigated plants have shown that they reach maturity in four years, but have practically no gum. Unless a satisfactory mode of nurture and replanting be discovered, the *guayule* industry is doomed.

In *Guadalajara* the average value of irrigated land is £70 and that of non-irrigated land £14 per acre.

The *Pacific Packing Company*, representing an investment of £ 50 000 and working under a 20 year concession from the State Government, has opened its plant for the slaughter of animals and the preparation of dressed meats.

Under the terms of the concession, this is now the only place in Guadalajara where animals may be killed for human food.

(1) See Abtract 1221 *Bulletin* April: Abstr. 1449 *Bulletin* May: and Abstr. 2184. *Bulletin* July, 1911. (*Ed.*).

Agriculture in Jamaica. — *The Agricultural News*, Vol. X, No. 242, p. 255. Barbados, August 5th, 1911. 2406

The value of the chief products exported during the year for 1908-09 were as follows : Jamaica.

Bananas	£	1 044 820
Cigars	»	263 850
Rum	»	186 803
Logwood and logwood extract	»	160 861
Coffee	»	116 166
Cacao	»	90 914
Sugar	»	77 047
Grape fruit and oranges	»	51 840

The development of the fruit industry of Jamaica continues, and the increased export of sugar and rum shows that these staples have proceeded some little way toward the recovery of their old position.

Other matters of general interest are the facts that the central sugar factories are doing successful work, and that a new factory has been opened in Westmoreland ; that, judging from voluntary returns, most of the land is in woods and ruinate, while an area amounting to over three-quarters of the area of such land is tilled in Guinea grass, or exists as common land ; and that in regard to the sale of Crown lands for small holdings, it has been decided to proceed with caution in the matter of selling by instalments, on account of the fact that about one quarter of the area at present out on credit is now in arrears or taken back.

Agriculture in Trinidad 1909-1910 (2). — *The Agricultural News*, Vol. X, No. 238, p. 181. Barbados, June 10th, 1911. 2407

Cacao. — The exports of cacao continue to increase in quantity, 51 575 000 lb. having been exported during the year ending December 31st, 1909. Trinidad.

A large number of manurial experiments were started at River Estate by the Department of Agriculture. Spraying experiments

(1) Guinea grass, *Panicum maximum*, common forage plant in the West Indies. (H. SEMLER, *Die Tropische Agrikultur.*, Vol. III, p. 150. 1903 Wismar, H. L. GERTH VAN WIJK, *A dictionary of Plant Names*, p. 946. The Hague, 1911.

(2) Under-sugar cane, 65 600 acres; cacao, 245 706; coffee, 4 120; ground provisions, 32 938; cocoanuts, 17 520; pasture, 20 870. In 1909 Trinidad exported sugar valued at £565 280; cocoa, £1 131 425 (*Statesman's Yearbook*, 1911, pp. 269 and 272). (*Ed.*).

have been carried out by the Board of Agriculture and the results are reported to be satisfactory.

The mycologist and the entomologist have also been engaged in studying the diseases of cacao and recommending remedies.

Sugar. — The exports during 1909 amounted to 45 330 tons; 11 401 cane farmers produced 154 000 tons of canes.

Special attention has been given during the year to the study of the « frog-hopper » insect (1), which is most destructive to the cane crops, with a view to discovering the most effective means of minimising the attacks of this pest.

Cocoa-nuts. — Exports during 1909 were over 20 300 000 nuts.

Rubber. — 80 000 trees of *Hevea*, 600 000 trees of *Castilloa* and 25 000 trees of *Funtumia* are growing in Trinidad.

The trees vary in age from 1 to 15 years. *Hevea* having been found to grow well, a large consignment of seeds was imported from the Malay States, but only a small number (about 3000) germinated. As it is intended to grow *Hevea* on a larger scale, a further supply of seeds will be obtained.

Castilloa trees grow well, and rubber has been exported in small quantities for the past few years. Tapping on a larger scale is about to be undertaken.

Rice. — This cultivation is entirely in the hands of small growers, who grow mostly for their own use.

Bananas. — Experiments in manuring bananas have been carried out by the Government on its lands known as St. Augustine, and it has been shown that a profitable return can be obtained from heavy applications of pen manure. The variety of banana known as « Governor » has been shown to possess several advantages over the « Gros Michel » variety. About 110 000 bunches have been exported during the year, showing a large increase over any previous year.

Agricultural Shows. — Five shows were held during the year in different districts.

Government Farm. — Additions have been made to the breeds of stock at the farm by the importation of Holstein, Guernsey and Jersey bulls and cows. A second sire jack has also been imported. The hackney and thoroughbred stallions continue to be highly appreciated.

(1) See p. 379 *Bull.* Dec. 1910. Abstract 352 *Bull.* Jan. 1911. Abstract 1584 *Bull.* May 1911. (*Ed.*).

Agriculture in Peru. *Peru To-Day*. No. 4, pp. 25-42. Lima, June, 1911. 2408

The three distinct Peruvian zones of the Coast, the Sierra and the Montaña have very different climates, but all are seats of agricultural industries.

A large part of the coast of Peru is arid, though traversed by fifty five rivers. The cultivable area of the valleys watered by these streams is above 1 500 000 acres, but not more than two fifths of this land is now irrigated and cultivated. Two large irrigation projects at least are about to be undertaken. The application of some of the principles of "dry farming" will also be studied, the Government sending a representative to the Congress in the United States this year. Peru.

In the coast regions the cool night air permits the growth of many temperate fruits, as well as all tropical fruits and vegetables.

Cereals, principally wheat, barley, and varieties of corn, are grown on the slopes and plateaus of the Andes, with splendid coffee, tobacco, and many vegetables and fruits.

In the Montaña the climate is salubrious and the soil fertile. The area may be taken at 250 000 square miles, mainly forest, In this domain the rubber lands are included.

Sugar growing is effected principally on the coast regions, the total area devoted to the industry being about 220 000 acres.

In the first six months of 1910 some 57 000 tons were exported, and during the year 1910 over 29 000 tons were consumed in the Republic.

The Government Experiment Station for sugar is studying methods to promote this important industry. The only variety of cane cultivated is the *Jamaica Amarilla*. Cotton is produced in Peru under the most favourable conditions known.

Sea Island gives an average per acre of 442 lbs; Mit Afifi gives up to 550 lbs. on the coast, and 830 lbs. in the upper valley of Pativilca. The native cotton (*Gossypium Peruvianum*) gave 625 lbs. per acre in the last harvest.

The consumption of cotton (1) in the factories of Peru in 1909 was 2 500 000 kgs. of ginned fibre, the grand total of production being therefore 23 870 256 kgs, or 52 624 843 lbs.

In 1909 was exported:

Cotton	kg.	21 370 256
Seed	»	7 761 212
Cake	»	4 528 039

(1) See Abstr. 1739. *Bull.* June 1911. (*Ed.*).

Hevea brasiliensis from which the *jebe* or highest grade Para rubber is obtained, is the principal source of rubber. *Castilloa* is also found in Peru, usually in the dryer lands at higher altitudes, and provides the " caucho ,, of trade.

Plantation rubber is being tried on the lands of the Peruvian Corporations Perené Colony with promise of success.

The rubber is mainly exported through the natural outlet of the Amazon River, *via* the Peruvian Port of Iquitos, and enters the market as Para rubber. The exportation for 1909 was of 2 801 547 kgs.

In the three regions into which tho Republic is divided, coffee is produced with great success; but where its cultivation has reached the largest development is in the " Montaña ,, districts. The best kind in the coast zone is grown in Pacasmayo.

In the " Sierra " district the most valued is that of Choquisongo. Tho excess of the production over the total home consumption, about 1500 tons, is exported to the United States, Chile, and other countries.

The vineyards are in the early stages of development. Of late years the cultivation has greatly improved and shoots or cuttings have been imported from Italy, France, Chile and United States. The valleys of Ica and Moquegua are especially adapted for this industry. In 1905 the Government decreed the establishment of experimental fields in certain estates in the valleys of Moquegua. The total production of wine for 1910 amounts to 10 463 850 litres and 1 711 783 litres of spirits. (1)

Maize is grown extensively and barley to a limited extent. Wheat is grown in several varieties, mainly upon the plateaus. The most important rice fields are in the Department of Lambayeque and the Province of Pacasmayo. The average amount of the annual crop may be put down as between 30 000 at 40 000 tons.

Dividivi, also known as " Tarra ,, is a tree native of Peru, being found chiefly in the Department of Ica. It is used for tanning. Every variety of tropical fruit grows or can be grown in Peru to perfection. Of the temperate fruits, the apple, peach, pear, plum, cherry, fig and quince may be taken as typical; excellent varieties being grown. The Department of Moquegua is particularly remarkable for its olives. At present, the production of olives does not suffice to meet the local demand, and very small quantities are exported.

Peru is the natural home of the potato which grows in many varieties. Of these the most famous is the Peruvian yellow potato. The whole world is familiar with *Lima beans*, the wide flat beans of greenish or yellowish colour and rich flavour.

The yield of the Lima variety is about 1700 lbs, per acre.

(1) 1 litre = 1.76 pints.

The total production of coca is estimated at 12 000 000 kilogr.

Cacao is not yet cultivated on a scale in any seuse commensurate with its possibilities,

Tumbez, Jaen, Huancabamba, Jevero and to some extent the Amazonas are the chief sources of supply of tobacco.

The forests of the Montaña contain trees of extraordinary size and beauty, capable of furnishing plain lumber and hard woods of almost every known variety and in unlimited quantity.

A very good grade of the so-called Panama hats is made in the province of Piura, of which Paita is the port. They are commercially known as Catacaos hats. Most of the straw which is stripped from a squatty palm, with fan-like leaves, called coquilla, comes from Ecuador. The yearly export is about 250 000 hats.

In Peru the raising of cattle, sheep, horses, goats, llamas, alpacas and vicuñas is extensively practised.

The best known stock raising districts are in the Departments of Cajamarca, Junin, Ayacucho and Puno, and in the Province of Acomayo, Chumbivilcas, Canas and Anta.

The Peruvian cattle are of medium size, strong for work in the field, but rather of an inferior quality for food or dairy purposes. In order to improve the stock, several English, French, American and Swiss choice breeds have been introduced with success, especially the Durham and Brown Swiss.

The hide industry in Peru is one of growing importance. The quantity of wool exported is over 4 000 tons. Peru has the advantage of producing besides sheep's wool that of the llama, the alpaca and the vicuña, the latter being highly esteemed for its fineness. The introduction of Patagonian sheep for cross breeding is one of the recent developments of the pastoral industry.

O' Sullivan-Beare (Brit. Cons. at São Paulo). — **Progress of Agriculture in São Paulo** (1). — *Brazil. Diplomatic and Consular Reports.* No. 4 700, pp. 1-18, London, June 1911. **2409**

A law passed by the Government of the State of São Paulo penalising the further planting of coffee within the State, has had the salutary effect of stimulating the cultivation of other products, such as rice, sugar, cotton, maize, *feijão* (beans), tobacco etc., the output of all of which has increased considerably during the past eight years. Since the year 1906, local production of rice has increased **Brazil: São Paulo**

(1) See Abstrs. 9 and 10 *Bulletin*: Jan. 1911.

to such an extent that the import of foreign rice has declined to an average of 1 500 tons annually. During the year 1910, the State of São Paulo produced the respectable total of 64 559 tons of rice, out of which it exported over 13 000 tons to neighbouring States.

At the present time the area under cotton cultivation in the State of São Paulo amounts to some 15 000 acres, and the annual output amounts to some 8 500 tons of cotton. There now exist there 23 cotton factories, the requirements of which not only absorb all the cotton locally produced, but necessitate the import of some 1 000 tons of cotton annually from Pernambuco.

It will be evident from consideration of the fact that the demand for sugar in São Paula exceeds the local production by 57 000 tons annually, that the establishment in the State of other sugar factories would constitute a safe and attractive opening for investment of capital.

The production both of maize and of *feijão* in São Paulo suffices, in both instances, for local consumption. In the case of *feijão*, supply has grown to exceed local demand, and the product in question has begun to figure amongst the exports. (1).

2410 KENNEDY (Brit. Minister at Montevideo). **Agriculture in Uruguay.** — *Uruguay Diplomatic and Consular Reports*, No. 4709, pp. 1-26. London, July 1911.

The slow growth, proved by the recent census and other statistics, both of the population of Uruguay and of its agricultural industry, constitutes a serious economic problem. This has not been overlooked by the authorities especially as regards agriculture, which they have endeavoured to promote indirectly, dedi-
Uruguay cating large sums to the improvement of transit, building new railway lines and assisting the spread of education. Moreover buildings, plantations and agricultural production have been granted exemption from property tax. These steps have borne some fruit, as is shown by the fact that the area under cultivation has increased from 281 000 hectares in 1901 to 550 000 hectares in 1908 (1 hectare = 2.4711 acres). (2)

This slow development, however, cannot be regarded as sufficient by those who desire to see the Republic promptly reach the

(1) See Abstr. 1740 *Bulletin*: June, 1911; and Abstr. 2114, July, 1911.
(2) See Abstr. 1348 *Bulletin*: May 1911, and Abstr. 2045 July 1911. (*Ed.*).

grade of progress corresponding to its natural wealth, soil, climate and privileged geographical position.

The following are the figures for acreage and production in 1909:

	Wheat	Flax	Oats	Barley	Canaryseed	Maize
Area in acres . .	691 968	45 853	17 020	8 718	353	508 170
Production (Tons)	233 910	12 259	6 710	3 072	119	169 464

The manager of the Central Uruguay Railway Company recently pointed out that there is room for a great and immediate improvement in the development of the wealth of the country, The pastoral industries should be reformed and modernised, and although these will always play the most important part in the commercial life of the Republic, the country ought nevertheless to cease regarding itself as exclusively pastoral, and should also turn its attention to the development of its agricultural resources.

The dairy industry is one that ought to give surprising results in a country where there are between 2 000 000 and 3 000 000 cows, and if the milk of one-tenth of these, averaging 6 litres a day, were properly used, it would form the basis of an exportation exceeding that of the agricultural products.

Another industry which should be developed is the export of frozen meat.

The successful operations of the "Sociedad Anonima La Frigorifica Uruguaya" whose business increased from 4 051 bullocks and 100 432 sheep killed in 1904-05 to 34 000 bullocks and 242 000 sheep in 1909-10, attracted the attention of the American Beef Trust Agents, but it is obviously to the interest of cattle breeders in Uruguay, that the Government should not allow this important industry to become the monopoly of a foreign company. It is evident from the following table that the chief wealth of Uruguay consists in animal products, of which the chief items exported in 1909 were:

	Dollars (1)
Live animals	4 037 857
Wool	18 682 112
Hides and sheepskins . . .	11 163 578
Jerked meat (tassajo). . . .	3 876 728
Tallow	1 474 899
Frozen meat and sheep. . .	602 412

The Government is desirous of encouraging and extending arboriculture, and prizes will be given for the plantation of woods

(1) 1 Dollar = 4*s.* 2*d.* (about.).

and artificial parks, and it is also intended to enact a law compelling every owner of pastoral land to plant five trees for every hectare of land.

The Government school of Agriculture will be placed in a position to supply landowners with trees.

2411 CORDOBA. **The Agricultural and Economic Development of Patagonia.** (Die wirtschaftliche Erschliessung Patagoniens). — *Deutsche Rundschau für Geographie.* XXXIII Jahrg., Heft 10, S. 454-467. Wien, 27 Juni, 1911.

Argentina: Patagonia

The first colonization of Patagonia dates from 1865. By the treaty of October 1881, Patagonia was divided between Chili and Argentina, 62 930 sq. miles falling to the former, and 259 620 sq. miles to the latter. Till within recent years, the opening up of the country advanced but slowly from various reasons.

The following table gives an idea of the progress made in bringing lands under cultivation from 1895 to 1907 in the southern territories of Patagonia.

Territory	Area Ha. (1)	Area cultivated in 1895 ha.	Area cultivated in 1907 Ha.
Neuquén	10 9703 00	3 583	17 530
Rio Negro . . .	19 6695 00	1 871	9 083
Chubut.	24 2039 00	3 598	4 224
Santa Cruz . . .	28 2750 00	20	2 137
Tierra del Fuego	2 1499 00	21	32

Chubut wheat is the best on the Argentine market. The valley of the Rio Negro is said to be very similar in quality of soil to the lower Nile Valley, but with colder climate. When irrigated it will afford a magnificent arable area of about 5 000 sq. kilometers ; and as it consists for the most part of disintegrated volcanic products, great fertility may safely be predicted.

The *barrancas* (2) usually consist of two terraces, one above the other, the upper extending far back into the high land. They are formed of the debris of mountains long since removed by erosion.

To improve the agricultural conditions of the country, the Government has made an appropriation of 250 million fr. to carry out

(1) 1 hectare = 2.4711 acre | 1 kilogr. = 2.2055 lbs. (*Ed.*).
(2) *Barranca* (Spanish) means properly a torrent bed.

a scheme of irrigation which will bring an area of 1 500 000 ha. under cultivation in the territory of the Rio Negro, with half a million hectares of valley lands; whereas at present only 20 000 ha. can be irrigated.

This irrigation scheme will include 31 000 ha. of land in the Limay district, 51 000 ha. along the Rio Neuquén, 120 000 ha. along the Rio Chubut, and 273 000 along the Rio Colorado.

Timber has recently been transported — by way of experiment — to the amount of 120 000 kgs, in two large rafts, on the river Limay from the island of Victoria on the lake of Nahuel-Huapu to Neuquén. It is calculated that the distance could be covered in 20 days, if the water were properly regulated; which could be done without much difficulty.

The principal resource of the southern territories is not so much agriculture as stock-breeding, more especially sheep-farming.

The live-stock of Patagonia was distributed as follows at the time of the last census :

Territory	Oxen	Horses	Sheep
Rio Negro	279 459	182 474	4 724 844
Neuquén	193 728	104 695	672 957
Chubut	334 995	165 832	2 123 628
Santa Cruz	25 339	36 382	2 387 569
Tierra del Fuego	11 851	10 173	1 342 351

There are several good lines of steamers and the Government ha begun to build new railway lines, and is encouraging cold-storage installations for the exportation of meat.

Valuable naphtha and petroleum wells have been discovered at Comodoro Rivadavia in the territory of Chubut.

The German-Argentinian Colonization Company has obtained from the Government a grant of 1 500 000 ha. of land to be used for three cattle ranches.

C. Braithwaite Wallis. (Brit. Consul General at Dekar). **Agriculture of French West Africa**. (Report for the year 1910 on the Trade, Commerce, Agriculture etc. of French West Africa). — *No.* 4745 *Annual Series. Diplomatic and Consular Reports—France*, p. 33; London, July, 1911 (1). 2412

French West Africa : Senegal

The colonies comprising the group of French West Africa are Senegal, Upper Senegal and Niger, French Guinea, Ivory Coast and Dahomey.

(1) See Abstr. 375 *Bulletin:* Feb. 1911.

The principal articles of export from French West Africa during the year 1909 were as follows: live animals, valued at £67 120; wool, 100 tons; skins, valued at £45 240; maize, 9 335 tons; rice, 213 tons; palm oil, 21 437 tons; gum copal; 150 tons; rubber, 4 318 tons; gum arabic, 3 459 tons; kolas, 39 tons; groundnuts, 228 000 tons; palm nuts, 43 369 tons; beans 326 tons; cotton 152 tons; ebony, 16 086 tons.

The attempts made to improve the breed of cattle in French West Africa are being continued and superior breeds of sheep and cattle have been introduced into the Upper Senegal and Niger. There are about 2 500 000 head of cattle in French West Africa, all of which are reported to be free of disease.

Senegal. — The climate of Senegal is good in some places, while in others it is damp and unhealthy.

The most unhealthy part is perhaps the southern portion of the colony and protectorate. The territory drained by the River Casamance is marshy and contains great numbers of mosquitoes. Malarial fever and black-water exist; and while the harmattan wind blows from December to March, the natives suffer from pneumonia. The dry season commences about November and December and ends in May. As regards agriculture, the growing of groundnuts forms the principal occupation. Senegal is *par exeellence* a groundnut growing country and the natives raise extensive crops. The crops most cultivated are the large millet, consisting of *Holcus sorghum*, Felah, Gadiala and the Bassi (white grained); also Diarnate (red grained), and Tigne (black grained); and the little millet consisting of Souna, Sanio, Nieniko, Tiotande and M'Kalat. The large millet grows best in fresh soil and newly turned earth, while the small millet thrives when planted in fine thin soils. The other agricultural products of Senegal are cocoa, gum, rubber, manioc, maize, cotton, indigo and rice. Various useful African woods including ebony are found in Southern Senegal, especially in the forest territories of the valley of the Casamance River. In 1909 the chief articles of exports were: groundnuts, £1 755 698; rubber, £308 023; gum, £61 751; palm nuts, £11 911.

French Guinea. — Rubber forms the principal product of the soil of French Guinea, and it is found in abundance in the Juta-Jallon and Faranah countries and in certain districts in Upper Guinea. West African rice is one of the finest in the world, possessing as it does most nourishing qualities. The palm tree is prolific in parts of French Guinea. In 1909 the export of palm nuts amounted to 3 660 000 tons, and that of palm oil to 130 tons. Groundnuts are grown in the mountainous country near

the littoral and in the Tambana, Kabitay, Cania, Morea and Benna countries. Limes, papaws, pineapples, bananas, oranges, guavas, plums, alligator pears, etc. are found in abundance in French Guinea. Cattle are plentiful in the country, the breeding of which forms one of the principal occupations of many of the native tribes. The following table shows the amount of cattle and sheep consumed and exported from French Guinea, together with the value thereof during the year 1909.

	Number	£	Francs
Cattle.			
Consumed in French Guinea	115 000	371 680	9 292 000
Exported	8 974	4 532	113 298
Sheep.			
Consumed in French Guinea.	5 000	2 020	50 500
Exported	2 812	1 703	42 577
Hides.			
Tanned and used in French Guinea	10 000		
Exported	476 652	33 698	842 466

The capital Konakry, possesses a botanical garden, where rubber, bananas, pineapples and other products are being experimented with.

Malarial fever exists throughout French Guinea, and mosquitoes, both the *Anopheles* and *Stegomya*, are prevalent in many places.

Ivory Coast. — There are 4 seasons on the Ivory Coast; the long dry season from the middle of December to the middle of April, the long rainy season from the middle of April to the middle of July, a short dry season from the middle of July to September, and a short rainy season from the middle of September, to the middle of December. In the forest region the rains are hearvier than on the coast. Malarial fever prevails throughout the Ivory Coast and disease-carrying mosquitoes and other tropical blood-sucking insects abound.

The forest region of this country is practically unexplored, although M. Chevalier has accomplished excellent work in that direction.

It is possible that more valuable timber is yet to be found in these same forests. To-day a good trade is done in mahogany) The *Khaya Ivorensis* (called by the natives locally « Dukouma » has given about 15 000 tons of this valuable wood annually. The

transport of the wood is the main difficulty. Other important indigenous products are : the palm tree, rubber which is reported to be of good quality, cocoanuts, faltrees (raphia and rotin), cotton, tobacco, bananas. rice, manioc, sugar cane, sweet potatoes, maize, groundnuts, cola nuts etc. The value of the principal exports in the year 1909 were : rubber, £272 406 ; palm oil, £114 622 ; palm nuts, £43 604 ; mahogany, £20 588 ; cocoa, £435.

Upper Senegal and Niger. — The climate is dry and much better than the climate in the West African littoral. Cotton, rubber, gum, millet, rice, maize, groundnuts and tobacco are the principal products. By the River Senegal. which is the main route, the principal agricultural exports are rubber (over 1 000 tons in 1909), ivory, feathers, gum, groundnuts and rice,

Mauritania. — The climate is comparatively healthy and there is little disease. Among the principal products of the soil are date trees, gum trees and cotton trees. In the Ardrar, Atar and Chinyuetti regions, in Tidjikka and Richid the datepalm flourishes. But the majority of the inhabitants of Mauritania do not go in much for agriculture. Camels thrive in the country, especially in the great plains of Aouker, Tasiat and Tiris. During the rainy season these animals do not prosper on the river banks, and they are much troubled by the mosquitoes which abound there. The best camels are those from ihe west and north, especially those bred and reared in Adrar.

Contrary to general opinion, the African camel is a delicate animal, which requires, when young, a good deal of attention.

The horses of Mauritania are small but strong. There are two kinds of cattle in Mauritania, those with humps and those without. The former make good transport animals. They can easily carry 100 kilos and are able to travel as fast as a camel.

Goats and sheep do well. Wool, however, only appears to be obtained in the Adrar and Tiris districts.

2413 **The Agricultural Exports from Dahomey.** (1) (Les exportations agricoles du Dahomey). — *Bulletin de l'Office Colonial*, No. 44. pp. 277-301 Melun, Août, 1911.

French West Africa: Dahomey

The tonnage of agricultural products exported from Dahomey in 1909 amounted to 56 000 tons, showing an excess of 13 000 tons, or 30 %, over the exports for 1909. This is due to the efforts made to encourage the raising of crops, to organize the economic development of the Colony, and to improve transportation.

(1) See Abstr. 1090 *Bull.* April, 1911.

The energetic measures which have been taken against the system of monoculture have made themselves felt, and maize, cotton, and just recently karité butter have begun to be exported The reduction of the railway rates has given the necessary stimulus to the extension of areas under cultivation and to the enlargement of the sphere of commercial activity.

Serious efforts have been made recently to acclimatise the horse in Lower Dahomey.

Most of the produce of Dahomey is exported; Liverpool and Hamburg being the most important market-centres in the world for the products of the palm. Dahomey maize pays in France an import duty of 3 fr. per 100 kgs. (1 *s.* 3 *d.* per cwt) whereas it only pays 1 mark 60 (about 9 $^{1}/_{2}$ *d* per cwt.) in Germany, and enters duty free in England.

The marvellous fertility of the soil, the rise in prices, and the facilities for exportation account for the surprising figures obtained for exports for 1910, as shown below :

Palm-oil	14,600	tons
Almonds	34,800	»
Copra	417	»
Cotton	198	»

The exportation of palm products could still be notably increased.

Karité butter has now won a place amongst the exports of Dahomey and a great future lies before it, as the area under the Shea-butter tree, or Karité, (*Butyrospermum* Parkii. *Sapotaceae*) extends throughout central Dahomey from Parakonu to Kandi.

The prohibition to tap wild rubber plants has reduced to a mere trifle the rubber exports passing through the ports and custom-houses.

Experiments show that the soil of Dahomey is very favourable to the cultivation of cacao.

The maize crop of 1910 was poor, owing to the bad weather, but with favourable climatic conditions, a good harvest can be counted upon.

Oxen, pigs, sheep, goats, and poultry are some of the resources of the fertile region of Porto Novo. The total exports are valued at 196,000 fr. (£ 7,840) showing an increase of 45,000 fr. (£ 1,800) over 1909.

There is considerable export and import trade in Kola-nuts (1).

The Dahomey Kola-nut differs from others of the species, in its white colour and the number of its lobes, of which there are 4 or 5.

The exports of indigo rose from 8 tons in 1909 to 14 in 1910, and those of honey from 2 tons to 13.

(1) Fruit of *Cola Acuminata.*

2414 **Agricultural Production in Senegal** (1). (Report of the Italian Consul at Rufisque). — *Bollettino del Ministero di Agric. Ind. e Com.* Anno X ; Vol. II, Serie B, Fasc. 4. pp. 95-101. Roma, 15 Agosto, 1911.

Pea-nuts are the most important crop of Senegal. In 1910, 180 000 tons were harvested. The natives are so improvident that they do not even keep a stock for seed. The Administration distributes the seed at the beginning of each season. Pea-nuts are sown at the first rains of June and July, and are harvested in December and January without requiring any attention in the meantime. The new railway line from Thiès to Kayes has done much to develop the cultivation of the pea-nut during the last two years.

Senegal

The products next in importance are : rubber, millet, and manioc. The two last are consumed on the local market.

Rubber is gathered in the Senegal bush, principally at Casamance and in the Sudan. The natives make an incision in the liana and coagulate the latex with salt or acidulated water.

The castor-oil plant grows wild, but is not utilised.

The natives raise cotton, but in very small quantities, and only for their personal needs. This crop requires great care and though satisfactory results have been obtained in the Sudan through Government encouragement, a great future in store for it is not likely.

The ten months of drought each year make agriculture difficult in Senegal. Irrigation would be too costly, in view of the vast spaces which would have to be artificially watered. All attempts at cultivation on a large scale have failed. The native does his farming with rude implements made by himself.

2415 E. D. Morel. **The Agricultural and Economic Condition of Southern Nigeria**. (La situation agricole et économique de la Nigérie Méridionale). — *Revue Economique Internationale*, Vol. III, No. 1, pp. 47 - 67, Bruxelles, 15-20 Juillet, 1911.

Southern Nigeria

Nigeria, one of the largest of British protectorates, covers an area of 330 000 sq. miles (2).

The Delta zone in Southern Nigeria is formed by the Niger. The flora of the delta consists mostly of mangrove trees. Further inland

(1) See above, Abstr. 2412.

(2) Southern Nigeria has an area of about 77 260 sq. miles, with an approximate population of 6 ½ millions of Yoruba tribes. There are 1 300 Europeans. *The Statesman's Yearbook for* 1911: p. 228. (*Ed.*).

the marshes give way to land covered with true tropical vegetation. The oil palm, (*Elais guineensis*) from which commercial palm-oil and palm nuts are obtained, grows by the million, and along with these palms grow the mahogany tree, hard-wood trees, ebony, gigantic cotton trees, gum trees, bananas etc.

The densest portions of the forest are full of climbing plants, lianas, ferns, and orchids. This zone is succeeded by wooded savannahs.

The chief native industry, which gives employment to many men, is the collection of palm oil and palm nuts. The natives also trade in wild rubber, copal-gum, hard woods, and other forest products which the administration is constantly striving to extend by new discoveries, assisted in this by the Imperial Institute in London.

The natives also engage in farming, and in some districts raise cacao, cotton, and maize. Some tribes have begun to make rubber plantations.

A special Government Forestry Department connected with the Department of Agriculture helps the natives to obtain all they can from the land.

The chief aims of these departments are to prevent the destruction of the forests and of the natural resources, to promote their scientific exploitation, to watch over the reproduction and replanting of the forests by forming communal administrative reserves, and to instruct the natives in the best ways of making plantations either of rubber, or of other kinds of trees.

The rubber plantations were started seven years ago by the Binis tribe, and the trees owned by the latter are now worth, at least, 3 550 000 fr (£.142 000).

The natives, though traders by nature, are much attached to the soil; therefore, though trade is the basis of the economic development of the colony, the scientific exploitation of the forests ranks next in importance.

Production in Northern Nigeria (1) **im 1909**. — *The Agricultural News*, vol. X, No. 241, p, 235, Barbados, July, 22, 1911. **2416**

The total value of the exports from the Protectorate was £406 722. **Northern Nigeria**

(1) The products of the low country are palm-oil and kernels; of the inland regions, rubber, ground nuts, shea-butter, ivory, hides, live-stock, ostrich feathers, capsicum, kolan ◇ ts and various drugs. Cotton-growing is now car-

The notable increase in the export of shea nuts and rubber shown by the returns may be expected to continue. The country now being tapped by the Baro-Kano Railway abounds in the *Butyrospermum Parkii*, and may tons of nuts have hitherto been allowed to rot on the ground for want of transport.

The Bassa Province, in which most of the rubber exported is obtained, has received a good deal of attention of late, and it may be confidently expected that, as inter-tribal feuds amongst the natives are stopped, trade will increase.

Although the high prices fetched for cotton in the local markets have up to the present made it impossible to obtain any large amount of this produce at a price that will allow of its purchase for export purposes, yet the enormous local production, variously estimated, but probably not less than 10 000 tons annually, ensures the future of this industry once means of transport have been secured, buying depots established, and the native has realized that he can always obtain in cash a reasonable figure for his cotton. The Emirs and native chiefs have been urged to encourage their people to undertake the planting of cotton, and the more intelligent of them are actively doing so.

The annual purchases, as returned by the British Cotton Growing Association, are as follows: 1905, 156 tons; 1906, 362 tons; 1907, 369 tons; 1908, 152 tons; and 1909, 375 tons.

A large quantity of selected seed has been distributed in the Provinces of Bassa, Kabba, Niger, and Ilorin.

2417 MAUGHAM, RICHARDS and TOTHILL (Brit. Cons. in Port. East Africa). **Agriculture in Portuguese East Africa.** — *Portugal. Diplomatic and Consular Reports*, No. 4710, pp. 1-48. London, July 1911.

Portuguese East Africa

A new director of Agriculture was appointed in *Deira* during the year. Since his arrival he has been carefully studying the resources of the Mozambique Company's territory, and hopes to establish within a short time two experimental farms, one in the

ried on and several ginneries are at work. Tobacco is also grown. Sheep and goat skins are tanned and dyed.

The construction of a railway of 400 miles (643.725 km.) from Baro (at the head of the permanently navigable portion of the Niger) to Bida, Zungern, Zaria, and Kano, is making good progress. The first section was completed at the end of 1909: the second, reaching the middle of the cotton district, will be completed in 1910, and the last at the end of 1911. (*Statesman's Yearbook*, 1911, pp. 227-228). (*Ed.*).

Revue Valley and the other in the Chimoio district. He is also strongly in favour of the farmers, in the two districts named, trying to grow wheat and barley, and for this purpose a quantity of seed is being obtained by the company and supplied to the farmers.

Great work has been done in the farming direction within the last two years, which is now beginning to bear fruit, especially in maize and sugar growing.

Maize is principally grown in the district of the Revue Valley and Chimoio.

It has been a great source of profit to the farmers who are now cultivating this grain in a more modern manner. During the year an expert maize grower has been appointed.

There is one important sugar plantation in the Mozambique Company's territory, This is the chief sugar factory on the Zambezi River.

The *Beira Rubber and Sugar Estates* consist of 60 000 acres and are situated on the Buzi River.

Since this company was formed, it has occupied itself principally with the cultivation of sugar and has nearly 9 000 acres under cultivation.

On a part of the estate a quantity of *Ceara* Rubber has been planted.

The Company has also during the year established extensive irrigation works and completed the laying of a light railway.

Ceara rubber has been in cultivation in the Mozambique Company's territory for the last 15 years, but owing to lack of experience in extracting the latex no very satisfactory results have been obtained; another more scientific experimental attempt will be made by the company during the coming year.

Mangrove bark has only within the last 16 months been exported in any quantities from the Mozambique Company's territory. The quality is good and the product plentiful. Over 4000 tons were shipped during 1910.

The Government has endeavoured to encourage the growing of maize in the district of Mozambique, and with the object of improving their quality, has imported a quantity of seed from Natal, which should have beneficial results in the near future.

Rubber continues to be of poor quality, being collected from the wild plant.

The agricultural possibilities of the Zambesi region are enormous. Concessions have been granted to companies whose capital varies from 250 000 to 12 500 000 francs.

The principal plantations are those of cocoanuts, and within a few years the present output of copra will be doubled and trebled, and an annual increase will go on for at least 12 years to come.

There are areas still available to increase the palms by millions.

In the near future the fibre industry is sure to assume fair proportions.

There is now a large acreage under *Agave Rigida.*

Rice cultivation is as yet in its infancy, but there are large tracts available for its cultivation that can be irrigated.

The exportation of groundnuts varies annually from 200 to 300 tons. The *nyembo* (cow pea), *manihot* and *mapira* (millet) are all cultivated on a considerable scale.

In the higher lands of the district large acreages have been planted with rubber. The trees grow remarkably well.

An expert agriculturist with long tropical experience was engaged last year to encourage agricultural development in the district, and aid the government in this task.

The Government could do very much towards helping the development both of agriculture and commerce at a small expenditure, considering the great possibilities of the Zambesi region.

2418 SUIGELMANN. **Agriculture in South Angola** (1). (Der Landwirtschaftliche Wert des portugiesischen Grenzgebietes Deutsch Südwest-Afrikas). — *Deutsche Kolonialzeitung*, No. 30, S. 504-506. Berin, 29 Juli, 1911.

The Portuguese districts of Mossamedes and Huilla, in Angola, border on German South West Africa.

South Angola

The section best suited to agriculture is that of Planalto (Mossamedes), at an altitude of from 1400 to 1800 meters. Next come the zones of Kunene, Ovambo, and Okavango.

The chief agricultural resource of Huilla is live-stock ; there are 300 000 head of oxen, some thorough-breds, others crossed with Portuguese breeds and those of the Cape, Transvaal, and Barotse. An average sized ox gives from 130 to 180 kgs of meat, (286.5 to 396 lbs) ; larger animals from 220 to 260 kgs (484.8 to 573 lbs).

Horses are few, as they cannot stand the climate, but judicious crossings have already reduced the mortality. Mules, of which there

(1) See Abstract No. 2048. *Bulletin* July, 1911. (*Ed.*).

are also a small number, are hardier. There are also some 33,400 pigs, of British and native breeds. Sheep, though ill cared for, do well ; there are some 26 400 head of these and 43 500 goats.

Maize is one of the most important crops : 940,000 quintals (1) are harvested each year: wheat comes next, 9,050 hectolitres (2), were harvested on Planalto: this crop varies from 178 to 660 or even 1700 litres (3) per hectare (4) according to the soil.

The yield of rye is some 8000 litres per ha., that of barley 43,500 litres.

A total of some 9,000 hectolitres of haricot beans is obtained ; they yield from 25 to 40 times the seed sown; next come peas, vegetables, pea-nuts, castor-oil, flax and agave.

Timber is plentiful.

The fruit crops are excellent : amongst others, cherries, figs, bananas, pineapples, pears and plums are raised.

Other crops are :

Manioc	Kg. (5)	26 000
Sweet (Cara) potatoes (6)	»	3 270 000
Potatoes	»	1 269 000
Cotton	»	140 000

Carpodinus chylorrhyza and *C. gracilis* yield rubber. A variety of *Landolphia*, which grows in the mountains of Shella, has not yet been exploited.

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(1) 1 Quintal = 100 kilog. = 220.462 lbs.
(2) 1 hectolitre = 2.75 bushels.
(3) 1 litre = 1.76 pints,
(4) 1 hectare = 2.4711 acres.
(5) 1 kilo = 2.2046 lbs.

(6) *Ipomaea Batatas*, Poir, Sweet Potato: cultivated in tropical America, and as far north as New Jersey. Its nativity is unknown. It rarely flowers and is propagated almost entirely by cuttings. It prefers a warm sandy soil, well drained and well aërated; and yields on an average as much as 200-400 bushels per acre.

The tubercles are difficult to store, as they are attacked by different rots.

V. H. N. STARNES, in L. H. BAEILEY'S, *Cyclopedia of American Horticulture*, pp. 1754-1757 : London and New York, 1902. (*Ed.*).

2419 Luc. **Agriculture in the Belgian Congo.** (L'agriculture au Congo Belge). — *L'Agriculture pratique des pays chauds.* An. II, Nos. 99 et 100, pp. 441-453, et 11-18. Paris, Juin et Juillet, 1911.

The writer describes the organization of agriculture in the Belgian Congo, giving information on the several institutions which direct agriculture, stock-breeding, and the forestry service in that colony. He describes the working of the botanical gardens, the experimental stations, the laboratory, the professional school, and the Government farm at Bandaka-kolé.

Belgian Congo

The agricultural administration has its head-quarters at Boma, and really amounts to a Bureau of the General Government.

Each Vice-Governor, or district Commissioner, is at the head of a technical staff entrusted with the direction of the agricultural and breeding-stations of each district or province.

The forestry service, organized by royal decree of Sept. 22, 1904, attends to the enforcement of the regulations on fiscal plantations, and gives the requisite advice or instructions for the up-keep and regular development of the same.

The director of the botanical garden at Eala, on the left bank of the Rutri, near its junction with the Congo, is in direct touch with the Governor General, and has in his charge all documents and data dealing with experiments concerning the whole possessions of the Belgian Government.

The Botanical Garden is divided into two sections, one the garden proper, the other an experimental ground for extensive farming. There are three branches of the service, that of farming proper, that of the laboratory, and that of the professional school, the chiefs of which are placed under the immediate authority of the director. The laboratory was opened recently, (July 1909), and the professional school was established by a decree of July 3rd. 1908. All crops of any economic importance are grown in the experimental garden on an area large enough to allow of reckoning the cost of production. Experiments have been made with alimentary plants such as coffee, cacao, tea, kola, as well as perfumery plants: southern-wood, cuscus-grass, patchouly; dyes such as arnatto; medicinal plants: coca, croton, cinchona; spices: vanilla, cloves; fibre plants: agave, abaca, manilla, etc., forage crops, fruits, and rubber.

The Government farm was opened in 1909, and the experiments in stock-breeding have been very successful; no cases of disease have occurred. The stables are kept with scrupulous attention, and the animals are in perfect condition.

Besides oxen, sheep and pigs are also raised under favourable conditions at Bandaka-Kolé.

The Development of the Katanga. — *Journal of the Royal Society of Arts*, Vol. LIX, No. 3067, p. 972. London, September 1, 1911. 2420

A Consular report has just been issued by the Board of Trade on the Katanga, a comparatively little known region of the Congo State. The Katanga, as its name implies, is a copper country, and some of the native mines have been worked for centuries. The soil of the Kundelunga river-valleys is rich and fertile, and capable of producing almost anything. These valleys should lend themselves to cultures of every description in addition to maize, which yields a large return and for which the market is unlimited. Fruit farming, tobacco growing, cotton and coffee planting should prove profitable undertakings. **Belgian Congo: Katanga**

Both cotton and tobacco are indigenous, and are cultivated by the natives on a small scale. Pig raising is possible everywhere. Lucerne would yield 3 crops per annum, Oats would probably do well, and wheat has been successfully grown in one or two instances. There is said to be an opening for fibre plantations, for fibre is found everywhere on ant-hills, which are a distinctive feature of the landscape. Outside the mining camps, native labour is plentiful and cheap. It is computed that the money already invested in various operations is not less than £10 000 000 (250 000 000 frcs.).

C. Morisseaux. **The Hinterland to the North of the Port of Beira, Mozambique.** (L'Hinterland Nord du Port de Beira, Mozambique). — *Revue des questions scientifiques.* Troisième série. Tome XX, pp. 200-218, Louvain, 20 juillet, 1911. 2421

The hinterland of the port of Beira comprises the region stretching between Beira and the Zambezi, the valley of the Zambezi as far as the rapids of Kaborabassa, the north of Mozambique, Nyasaland, North-East Rhodesia, and the south of German East Africa. **Mozambique**

The Zambezi is now a centre for important crops and factories. Last year 17,000 tons of cane-sugar were produced ; the natives cultivate pea-nuts on a large scale, and live-stock prospers there. Of course this production which is exported, implies corresponding imports. Both exports and imports pass through the port of Beira.

Hitherto the Portuguese Shiré has been an exclusively agricultural country, and it is already contributing to the trade of the Zambezi. The chief products of Nyasaland are cotton, coffee, and tobacco. Other crops are tea, pea-nuts, pepper, sansevieria, rubber, etc.

Coffee seems to be native to Nyasaland, and for a long time it was the staple export (1).

Cotton has been introduced, and after repeated efforts, thanks to scientific cultivation, it is doing excellently ; so much so that certain American varieties fetch higher prices when they come from Nyasaland than when they have been grown in the United States. The great drawback to all these countries is the lack of means of communication.

2422 **European and Native Crops in Madagascar.** (Cultures européennes et cultures indigènes à Madagascar). — *Bulletin de l'Office Colonial*, No. 44, p. 268-269, Melun, Août 1911.

Madagascar

Although the area exploited by Europeans rose in 1910 to 395 108 hectares, or 976 351.378 acres, showing an increase of nearly 100 000 ha., or 247,110 acres over 1909, the actual area brought under cultivation was only increased by 3,000 hectares (7413 acres), only amounting in all to 42,631 ha. (105 345 ac.).

Rich European plantations such as those of vanilla, cacao, coffee, etc. are prospering; the area planted is increasing and the quality of the product is improving.

The results obtained with the clove-tree at Sainte-Marie have been particularly encouraging, the crop exceeding all expectations. The European mulberry has gained some ground since 1909 and will do so yet more.

In Imérina the lack of timber, which makes itself more and more felt, has led to some attenpts at plantations and reafforestation.

All the native crops are progressing favourably, both as regards the area under cultivation and the quantity produced. Some 107 hectares, or 264 acres, are under wheat as against 9 (22.2 ac.) in 1909. Cape-peas hold a prominent place, and their production has tripled since 1909. Cattle increase at a normal rate. In the high table-land and central provinces the number of pigs has temporarily declined owing to the great d mand for lard for exportation.

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(1) " Coffee seems to have been taken originally from Abyssinia to Yemen in the 14th century. It is however not impossible that it is equally indigenous in the mountains of Arabia. It has certainiy been found in a wild state not ouly in Abyssinia, but also on the shores of the Victoria Nyanza and in Angola, in the district of Golungo Alto ». (E. RAOUL et E. DAROLLES : *Cultures du Caféier*, p. 1, Paris, Challamel, 1897. See also: DE CANDOLLE, *Origine des Plantes Cultivées ;* pp. 333-336. Paris; Alcan, 1896. (*Ed.*).

MÜLLER. **The Agricultural Development of German South-West Africa.** — *Diplomatic and Cousular Reports*, No. 4673, pp. 1-35. London, June 1911. 2423

There is in German South-West Africa an all round improvement in the quantity of stock held. On April 1, 1911, the following increases over the same date of 1909 were ascertained: Large stock, 25 027; Afrikander sheep 63 345; Merino sheep, 9 112; Augoras, 3 623; Boer goats, 81 449; horses 2 390; Pigs increased from 2 917 to 5 208. German S. W. Africa

Considerable quantities of maize and potatoes were grown in the Grootfontain district and the north generally. Tobacco also yielded good returus.

It is a peculiar characteristic of the *veld* in German South-West Africa, that it retains its nutritive qualities even in very prolonged droughts. As long as the veld is not burned, cattle can generally contrive to pick up a living. The export of hides and wool shows increase, and a considerable amount of fresh meat is supplied to shipping in the local ports.

British South Africa has been drawn upon largely for breeding-stock of every description. The country is rapidly being restocked, but it will be some years before it can be filled to the extent of its known carrying capacity.

A beginning has been made with ostrich farming. In April 1910, there were 334 tame birds in the country. There are also a good number of wild birds which appear to have increased considerably during the last few years. The farmers have neither the experience nor the capital to develop the industry with any degree of rapidity. The Government has established a stud farm near Windhuk for the purpose of breeding Karakul sheep. In April, there were 379 thorough breds on the farm and 40 rams had been sold to farmers. The idea is to use them in crossing with other sheep and eventually to establish the breed in the country.

Boring for water has been carried out and met with encouraging results. During the year 1910 boring resulted in adding 3 184 cubic metres of water per day to the available supply (1).

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(1) 1 cub metre = 35.3165 cub. ft. (*Ed.*).

2424 C. W. Stiles and L. L. Lumsden. **The Sanitary Privy.** — *U. S. Department of Agriculture - Farmers' Bulletin.* No. 463. 32 pages. Washington, 22 August 1911.

The following extracts will suffice to show the importance of this subject, particularly in the case of country houses and farms:

Flies can carry various disease germs to man. By so doing they kill thousands of people, especially babies, every year; therefore kill the flies and save the babies.

If flies have access to human excrement, they not only feed upon it, but they lay their eggs in it. After a few hours the egg hatches out a maggot; this feeds in the filth for about five days and then forms a pupa; after about five days the adult fly comes out of the pupal case, feeds on the filth, and carries disease germs from the filth to the house, depositing these germs on the foods. Thus flies carry disease to people. A fly drops its excrement about once every 4 ½ minutes, and may spread germs not only in this way, but also with its feet, wings, and mouth parts.

States United

Even if excrement containing fly maggots is buried under as much as 6 feet of sand, the maggots can crawl to the surface, bringing disease germs with them.

Thus it is clear that if flies are kept away from human excrement, not only will they decrease in numbers, but they will be prevented from spreading certain diseases, such as typhoid fever. This can be done by the use of sanitary privies, the construction of which is carefully and fully described.

Lack of sanitary privies on neighbouring farms may be responsible for cases of typhoid fever, hookworm disease, and other infections on farms which are provided with sanitary privies, because disease germs may be carried for considerable distances by flies, by animals by feet of persons, by wagon wheels, or by drainage from one farm to another.

In view of these well-established facts it is evident that one of the highest duties that rest upon a farmer, as a father and citizen, is not only to have a sanitary privy on his farm, but to insist that the pollution of soil with human excreta be prevented throughout the entire neighbourhood by the use of sanitary privies.

In the United States about 400 000 persons suffer from, and about 35 000 die from typhoid each year; over 2 000 000 persons have hookworm disease. Thousands of these deaths and many thousands of these cases of disease might be prevented by the simple use of sanitary privies. A compulsory sanitary privy law or ordinance should therefore be enacted, and be strictly enforced, in every locality not provided with a properly maintained sewer system.

F. C. Bishopp. **The Rocky Mountain Spotted-Fever Tick. *(Demacentor venustus)*** (Entomological Papers). — *Nature*, Vol. 86, No. 2174. London, June 29, 1911. 2425

This paper deals with the distribution of the Rocky Mountain spotted-fever tick (*Demacentor venustus*).

Now that it is known that the fever is principally, if not exclusively, transmitted to man by the tick, the determination of the distributional area of the latter has become a matter of importance. **United States**

West Montana is the district where the disease occurs in its most virulent form, but it is also met with, although in a less severe type, in parts of Idaho, of Wyoming, Utah and Nevada, and these areas coincide to a great extent, with the maximum abundance of the tick, the whole range of which includes parts of Washington, Montana, Oregon, Idaho, Wyoming, Nevada, Utah, Colorado and a small tract in New Mexico.

In its earlier stages, the tick infests small mammals, but later, migrates to the larger domesticated species, and it is in districts where the latter abound and brush-wood is plentiful, that it attains its maximum development.

Unfortunately the disease appears to be spreading.

Mosquito Larvae in Drinking Water. — *The Agricultural News*, Vol. X, No. 233, p. 105. Barbados, April 1, 1911. 2426

An article in the *Annals of Tropical Medicine and Parasitology* for 1910, page 591, describes experiments which were conducted for the purpose of determining the effect of the introduction of mosquito larvae, or « wrigglers, » into water, particularly in regard to the number of bacteria contained therein. The larvae employed were those of several species of *Culex*, and of *Theobaldia annulata*. These were placed in drinking water which had not been sterilized in any way, and the number of bacteria in the water was determined from day to day: while the same determination which was made for similar drinking water, without larvae, was used as a control. **Barbados**

The result of the investigation was to show that the effect of larvae in water is to increase the number of bacteria present, to a very considerable extent.

2427 **International Congress of Olive-growers at Avignon.** (Congrès International d'Oléiculture et Excursions Oléicoles). — *La Petite Revue agricole et horticole*, 17e année, No. 403, p. 209. Antibes, 24 Septembre 1911.

The National Society of Olive-Growers of France has organized an International Congress to be held at Avignon from 14 to 17 November 1911, to study the parasites of the olive-tree, and new methods
France of extracting olive-oil.

Interesting papers will also be read on the purification of the latter, as well as on the extraction of oil in vacuo (Système Acapulco) (1) which has been carried out by Prof. Mingioli at the Agricultural School at Portici, Naples, for the Italian Government. Excursions will be made to places of interest in the neighourhood as well as visits to some of the best managed olive estates and oil works where many of the finest brands of oil are manufactured.

Members of the Congress will be entitled to a reduction of 50 per cent on all railway fares, and to special terms at the principal hotels at Avignon.

2428 **Vth International Dairy Congress at Stockholm. Text of Resolutions Adopted.** (Ve Congrès International de Laiterie à Stockholm. Texte des Vœux émis). — *L'industrie laitière belge*, 12 Août, 1911, No. 11, Anvers, p. 81.

SECTION I.

Milk Production. 1st. Question. — The Vth International Dairy Congress notes that on the one hand the practical observations, and on the other the scientific investigations reported on by Privy Councillor Kellner, show that certain foods influence the quantity
Sweden of fat in milk in most good milch cows, but that the following points still require further study, namely :

1) When is the influence of different foods first apparent ?

2) Does this influence persist, and to what extent ?

3) Does the addition of certain foods also exercise an influence on the quality of the fatty substances ?

4) Is the increase of fatty substances, obtained by adding certain foods to a basal ration, profitable ?

No resolution was passed in connection with the 2nd. question.

(1) See Abstr. 571, *Bulletin*, Feb. 1911.

3rd. Question. — The Vth International Dairy Congress, recognizing the excellent results obtained by inspection boards in Sweden, Denmark, Norway, Holland, Germany, Finland, and Austria, declares that such boards of inspection for the control of cattle-feeds are one of the best means of improving the breed of milch cows and increasing the production and reducing the cost of milk. Moreover, it calls attention to the great importance of Boards of Inspection in introducing scientific and economic systems of feeding, proper systems of bookkeeping, and by spreading the knowledge of the excellent results obtained in cattle breeding.

4th Question. 1) The Congress charges a special committee to draw up rules for the veterinary inspection of milk, which shall be submitted to the next Congress for approval.

2) The Congress calls on the dairy associations of the several countries to promote the introduction of veterinary inspection of milk in all towns and other important centres, in Government and municipal dairies,in and all dairies which sell milk for infants or inspected milk, in all central dairies and as far as possible in private dairies, and that, for this purpose, dairy commissions be appointed consisting of producers, physicians and veterinary surgeons.

3) Reports from the several countries shall inform the Dairy Congress at each session of the progress made up to date in the matter of veterinary inspection in the several countries, so that this question may stand on the agenda until it has been regulated in a satisfactory manner.

The 5th question gave rise to no resolutions.

Section II.

Treatment and use of milk. 6th Question. (1)

The 7th and 8th Questions gave rise to no resolutions.

9th. Question. 1). — The next International Dairy Congress will be called on to determine the normal content in fats and dry matter of those cheeses which are in general use throughout the world.

To ensure the accuracy of the results of these deliberations, the standing committee of the Permanent Bureau of the International Dairy Federation will be instructed to make the necessary preparatory studies, with a view to coming to an international agreement on the methods to be employed.

2) With reference to margarine cheese, the Congress resolved :

(1) The resolution on Question 6 has appeared as Abstr. 2051 in this *Bull.*, July 1911. (*Ed.*).

Apart from the regular limitations, cheese makers should be forbidden to make margarine cheeses to imitate the ordinary brands known to trade ; such margarine cheeses should be as different as possible from such brands.

3) The Congress expressed the wish that in the interests of the cheese industry guarantees be given as to the origin and composition of certain cheeses which are found on most of the world's markets.

10*th Question.* The Congress expresses the wish that the International Dairy Federation invite the national dairy associations to determine on a program and method of scientific training to be adopted by all to ensure a capable staff of dairy workers, and to determine also the conditions on which such staff should be admitted.

To avoid misunderstandings, the Congress deems it essential that all dairy publications make use of the metric system of weights and measures, and of centigrade degrees for registering temperature.

2429 **National Irrigation Congress.** — *Nineteenth Congress*, Chicago, 5-9 Dec. 1911.

Under date of Aug. 26 th 1911, Mr. E. Mc Queen Gray, President of the University and Foreign Secretary of the Nat. Irrig. Congress, was kind enough to send the following information to the International Institute of Agriculture.

United States : Illinois : Chicago

"I have the honour to inform you that the Nineteenth National Irrigation Congress will, this year, be held at Chicago from December 5th-9th.

In the past, this Congress, which may be regarded as the most important organisation of Economic Agriculture in the United States, and perhaps in the whole world, has directed all its efforts to the development of the western portion of the United States, and was one of the chief factors which contributed to the passing of the Reclamation Act, owing to which the sum of more than $ 60 000 000 has been expended on the irrigation of the arid regions of the West.

Further, the additional amount of $ 48 000 000 has been assigned for the purpose of irrigation, of which $ 1 000 000 is paid out every month.

By means of the meetings, which will be held at Chicago, the Congress will do all that lies in its power to induce the Government of the United States to pursue the same course of action, with

regard to the drainage of the marshlands of national territory, as they followed in the case of the irrigation of the arid regions.

The question of the possible utilization of the abandoned farms in the State of New York will be considered, and also that of the exploitation of the cleared tracts in Michigan, Wisconsin, and Minnesota.

During the last three years, the Governments of foreign countries occupied in the irrigation of dry districts have shown an ever-increasing interest in the Congress, and have sent to it annually a certain number of Delegates, as representatives, and also to take part in the deliberations of the Assembly.

The presence and co-operation of the foreign delegates have contributed greatly to the dignity and importance of the Congress.

Mr. E. Mc Queen Gray, Foreign Secretary of the National Irrigation Congress (Office of the Foreign Secretary, University of New Mexico, Albuquerque, New Mexico, U. S. A), offers to supply all information concerning this Congress.

R. F. KNIGHT and C. G. THOMSON. **Brief Report on the Veterinary Institutions of Japan**. — *Tropical Agriculturist*, Vol. XXXVII, No. 1, pp. 44-49. Colombo, July 1911. **2430**

The veterinary work forms one of the divisions of the Bureau of Agriculture, which is under the administration of the Minister of Agriculture and Commerce, and to it are assigned the inspection of meat, the inspection and quarantine of imported animals and the control of contagious and infectious animal diseases. Although the improvement of equines is left entirely in the hands of the military department, the remainder of the animal husbandry work comes within the field of the Bureau, and so much has been done by the importation of foreign stock that in some localities it is difficult to find an animal of pure Japanese blood. **Japan**

Numerous publications pertaining to veterinary work and organization have been issued. The Japanese show that they are fully aware of the importance of animal diseases by the establishment of suitable quarantine stations and slanghter-houses, and of veterinary colleges and laboratories for the study of subjects pertaining to veterinary work and the education of farmers to protect their livestock interest. An Institute for the Infectious Diseases of Animals has been erected at Tokyo. Its scope is indicated by the fol-

lowing table of the various preparations made there during the year 1909:

Anti-rinderpest serum	litres	400
Anthrax serum	do.	151
Anthrax vaccine	do.	5
Tuberculin	do.	33
Mallein	cubic centimeters	725
Chicken cholera vaccine	litres	40
Swine erysipelas serum	do.	2.5
Anti-streptococci serum	do.	29

The preparation of serum for hog cholera and blackleg has just been begun.

2431 E. LEPLAE. **The Botanic Garden of Buitenzorg, Java.** (Le Jardin Botanique de Buitenzorg, Java). — *Bulletin Agricole du Congo Belge*, Vol. II, No. 2, pp. 179-196. Bruxelles, Juin 1911.

Four botanic gardens in the tropics are noted for their wealth in plants, the beauty of their arrangement, and the magnificence of their situation; these are the gardens of Rio Janeiro, Brazil; Peradeniya, Ceylon; Singapore in the Malacca promontory, and Buitenzorg, Java.

Java

Of these the richest is undoubtedly the botanic garden of Buitenzorg; it also has the largest number of laboratories and experiment stations and is an ideal place for students of botany and agriculture.

Moreover, Buitenzorg extends to foreign students more generous and ready welcome then any other similar institution; a special laboratory is reserved for their use, and the library with its rich collection of botanical and zoological collections is open to them. Buitenzorg is especially interesting for the study of tropical agriculture, as this place is the head-quarters of the technical branches of the Department of Agriculture of the Dutch East Indies.

Buitenzorg, called the Eden of the tropics, comprises the European town, the Governor General's residence, partially surrounded by the botanic garden, the native city, and the Chinese Kampong. It is enclosed by two torrential rivers the Tjiliwong and the Tjisadane. Buitenzorg enjoys a mild climate, due not to its altitude, which does not exceed 265 meters, but to frequent storms and daily rains. The average temperature for the year is 20° C. The average for September, the hottest month, is 25.5° C., and that for February, the coldest month, never falls below 14.5° C. During the day the thermometer registers 30°, 31° and even 33° C during the hot season.

The climate is very damp. It rains almost every day, generally between 12 and 4 p. m., and the rain is often accompanied by violent storms, sometimes by almost uninterrupted electric discharges. The total annual rainfall at Buitenzorg is 4367 mm. or double that of the dampest regions of the Belgian Congo. The rainfall is very evenly distributed, as it rains one day on three even in the driest season.

The average rainfall at Buitenzorg is :

January	471 mm.	25 days of rain
February	407 »	23 » » »
March	444 »	24 » » »
April	427 »	21 » » »
May	355 »	17 » » »
June	270 »	13 » » »
Jnly	254 »	11 » » »
August	226 »	11 » » »
September	356 »	14 » » »
October	407 »	18 » » »
November	377 »	20 » » »
December	373 »	22 » » »

The first agricultural institution opened at Buitenzorg was an experimental garden, to which a botanical collection was annexed from the start. In 1868 important changes were made in the botanic garden. It was quite shut off from the Governor's park, to which it had been annexed. Besides this, Teysmann opened five annexes to it in the mountains at different altitudes (1050 to 3020 meters), so as to cultivate under normal conditions the plants of the coldest regions. In 1880 the Director, Prof. Treub, greatly stimulated the development of the scientific section of the work : he opened laboratories, and placed them at the service of foreign men of science. In short, he transformed this botanic garden into an International Tropical Station for the study of botany, and it has remained unrivalled as such. At present, efforts are being made to promote the agricultural activity of the scientific staff, in view of the preponderating importance of agriculture in the economy of the Dutch East Indies. The botanic garden occupies an area of 54 hectares (133 acres) which are entirely irrigated.

Over 9000 kinds of plants are grown at Buitenzorg. They are generally classified by families according to the flora of Bentham and Hooker.

The following scientific institutions are connected with the garden:

1. Botanical library with reading room, containing 25 000 volumes.

2. Botanical museum and Herbarium. This latter contains over 100 000 specimens, preserved in zinc receptacles.
3. Laboratory for agricultural chemistry.
4. Pharmacological laboratory.
5. Agricultural and geological laboratory.
6. Laboratory for the study of agricultural plants.
7. « for the study of Deli tobacco.
8. « for the study of coffee.
9. « for ferments and fibre plants.
10. « for strangers.
11. Botanical forestry museum.
12. Laboratory for the study of tea.
13. Zoological laboratory.
14. Printing office with stereotype plant.
15. Laboratory of phytopathology.

The experimental station at Pjikeumenth must be added to this long list. It is of special importance for agriculture, and is about half an hour from Buitenzorg ; the several varieties of colonial crops are grown there on large plots of land on a practical system. This station is deserving of special study, as is also the School of Agriculture annexed to it since 1903, which receives both European and native students.

2432 **The Stock Breeding Institute at Pinheiro, Brazil.** (Posto Zootecnico Federale). — *A Evoluçao Agricola*, N. XXIII, Ann o II, pp. 17-18 San Paulo, Maio 1911.

The Stock Breeding Institute at Pinheiro in the State of Rio de Janeiro was organised by Dr. Hector Raquet in accordance with Decree No. 7622 of Oct. 21, 1909.

Brazil

The regulations were established by Decree No. 8366 of Nov. 10 1910.

The aim of the Institute is to stimulate the development of stock-breeding and the industries dependent on it, throughout the State, but more especially in the district where the Institute is situated.

A School of Agriculture is attached to it (Eschola Agricola de Pinheiro).

Attached to the Institution there will be: a Cabinet of Stock Breeding, a Bacteriological Laboratory, a Veterinary Pharmacy, a Veterinary Hospital, a Hall for Post Mortem Examinations, Baths

nd a Clinical Surgery, Laboratories of Agricultural Chemistry nd of Bromatology, Phytopathology, and Entomology etc.

There will be also an experiment farm of 5 000 ha (12 350 acres), Library, a Meteorological Observatory, a Depot of Agricultural achines.

There are four technical sections; Stock-breeding and Veterinary cience; Agricultural Chemistry and Bromatology; Agriculture; airy Industry.

ILK. **The Swedish Station of Experimental Pisciculture at Aneboda.** — See below, Abstract No. 2860. 2433

. H. ROBINSON. **Agricultural Instruction in the Public High Schools of the United States.** (Thesis, Columbia Univ., 1910, pp. 202, map 1). — *Exp. Sta. Rec.* Vol. XXIV, No. 6, pp. 543. Washington, May, 1911 (1). 2434

This book comprises the most comprehensive study of High chool instruction in agriculture that has been made in the United tates.

It contains seven chapters and two appendices. The first hapter deals with the development and present status of general ducation in the United States; the second with agriculture in the ublic High Schools, including statistics of schools teaching agriculure as a separate subject and those teaching it incidentally; the hird describes the work, equipment, and methods of instruction n typical High Schools visited by the writer, including some that aught agriculture one year or less, some three or four years, and ne that taught it incidentally; the fourth discusses problems f administration, agricultural equipment, and methods of teaching, ncluding such matters as the time given to agriculture in comparison with other school subjects, field work, and books used. The ifth contains interesting data concerning the preparation and salaries f teachers of agriculture in High Schools; the sixth discusses briefly he different types of special secondary schools of agriculture; and he seventh deals with problems of agricultural instruction in the secondary schools, such as the effect of establishing special schools, United States

(1) See Abstrs. 725 and 716 *Bulletin*, March 1911; and Abstrs. 1634 and 1635, une 1911. (*Ed.*).

the attitude of colleges, and the difficulties of instruction. One of the appendices contains a summary of legislation pertaining to agricultural instruction in public High Schools and the other a list of references on agricultural education.

Scattered throughout the work are 54 tables giving in condensed form the results of the writer's investigations, and these with the topical index will render much valuable information available to students of education.

2435 SCHMIDT. **Some Problems of Non-European Agriculture**. (Probleme der Aussereuropäischen Landwirtschaft). — *Deutsche Landwirtschaftliche Presse*, No. 48, pp. 557-558. Berlin, 17. Juni 1911.

The conditions of agriculture in America and in the British colonies differ widely from those prevailing in Europe. Agriculture in those countries is young, and unlike European agriculture, it has been able to avail itself of the lessons taught by experience and science. The number of farmers is proportionately very small as compared to the vastness of the territories. The value of the land is low and there is, therefore, no need to obtain from it the utmost it can yield. So long as room remains in those countries to form hundreds of thousands of farms, the non-European farmer has no need for intensive agriculture. Therefore farming in those countries has more the character of a capitalistic than of an agricultural enterprise.

America. British Colonies

The great manufacturing countries of Europe, more especially England and Belgium, consume the produce of non-European agriculture. But whereas the European consumer succeds in getting into direct dealings with the European producer, a whole army of middlemen intervene between him and the non-European producer, and these middlemen cause prices to rise above their fair level.

For these reasons, efforts are made in the British Colonies to reduce the number of intermediate speculators, by reducing railway rates and by legislating against speculation. But spite of all this the problem remains unsolved.

Another problem is due to the fact that rotation of crops is not practised in the vast estates of non-European countries, which suffer from the injury caused by monoculture, injuries which, in certain years may be absolutely ruinous to whole countries. Yet, spite of this, the future of non-European agriculture lies in specialisation, but means must be found to obviate its dangers, especially that of over production.

The third problem is more especially one of agricultural chemistry, and consists in the fact that where the land is held in vast estates it is not exploited to its full capacity, even taking into account the systems of extensive cultivation in use, but is exploited on the easiest known systems. This has been the case, not only in Canada and the United States, but also in Australia, where land, admirably suited to potatoes, has been used instead for grazing sheep.

It behoves agricultural chemistry in non-European countries to step in and decide *a priori* the kind of specialised use to which the land can best be put.

In Europe, the farmer is an agriculturist, in non-European countries he is agriculturist and merchant at the same time (1).

It might be supposed that the enormous growth of population in Europe will suffice to absorb all the future production of America and the British Colonies. But this can hardly be the case, since European production is increasing and will continue to increase, and also because non-European agriculture is already specialising more and more in the cultivation of fibre and industrial crops, and this will be its great function in the future at the cost of the production of food-stuffs.

Mc. Burritt. **A Successful New York Farm**. -- *U. S. Dept. Agr. Farmers' Bul.* No. 454, pp. 32. Washington, July 12, 1911. **2436**

The bulletin under review is the story of the struggles and successes of a plain New York farmer, who remained on the farm through the hard-times period and succeeded.

United States: New York

The farm was an average one for the section and consisted of 57 acres of laud. It is now thoroughly tile drained with more than 10 miles of tile, or 56 rods per acre. The rotation is of wheat, clover, and potatoes. Wheat has averaged 26.6 bush. per acre for the last 12 years ; clover averages 2 to 4 tons of cured hay per acre for the first cutting, the second crop being usually ploughed under. Potatoes are the money crop. The average yield per acre for the last 9 years has been 282 bushels, as against 132 bushels for the preceeding 9 years, the increase being due to better drainage, seed selection, and better cultivation, fertilizing and spraying methods.

(1) Due more especially to the system of monoculture, the evil effects of which are making themselves felt in several countries. The warnings given by Liebig are still valid. (*Ed.*).

Measured by net income this farm may be called fairly successful. During the last 9 years it has paid the owner an average net return of over 700 dollars per year, or 7.1 per cent on an investment of 10 000 dollars and an annual salary of 300 dollars.

The cost per acre and per bushel of growing potatoes on the farm for the 9 years 1901-1909 is estimated as follows:

ITEMS OF EXPENSE	Cost per acre		Cost per bushel
	Separate items	Total	
	Dollars (1)	Dollars	Cents
Ploughing	3.00		
Preparation of land	2.00		
Planting	1.00		
Cultivating (14 times)	6.30		
Spraying	6.30		
Harvesting	7.00		
Marketing	3.00		
Cost of labour	...	28.60	10.2
Seed (22 bush. at 42.4 cents)	9.32		
Fertilizers (1909 figures)	25.63		
Spraying material (1908 figures)	6.00		
Use of equipment (28 dollars per acre at 6 per cent)	1.68		
Interest (6 per cent on land, 1.50 dollars, on rental value)	9.00		
Cost of seed, fertilizer, equipment, etc.	...	51.63	18.2
Total cost	...	80.23	28.4
Receipts	...	119.56	42.4
Net profit	...	39.33	14.0

(1) $ 1 = 49.32 *d*.

. Ph. Wagner. **Considerations on Yield of Fruit Trees along Highways.** See below, Abstr 2657. 2437

H. Sagnier. **Louis Grandeau.** — *Journal d'Agriculture pratique*, 75ème année, No. 39, pp. 388-389. Paris, Septembre, 1911. 2438

Mr. Louis Grandeau was born in 1834 at Pont-à-Mousson, in Lorraine. He owned large estates and always followed carefully the application of modern scientific methods in their cultivation, encouraging his farmers to adopt them.

The ten years he spent under Sainte Claire-Deville at the Normal High School, and under Claude Bernard at the Collège de France, were put to good use. His original studies on the pre- France
sence of rubidium and caesium in natural and artificial alcaline waters were favourably received by the *Académie des Sciences*. Other works amongst which those on spectral analysis, on the application of dialysis in detecting alcaloids, on the methods of analysing water, etc., are still deserving of mention. But Grandeau was drawn irresistibly to the study of organic chemistry and physiology. His travels in Germany had acquainted him with the great development of chemistry applied to agriculture in that country, where laboratories and agricultural stations had already become very numerous.

In 1868 Duruy, whose name is associated with the first efforts made to introduce the teaching of agriculture into the University curriculum, conferred on Grandeau the Chair of chemistry and physiology applied to agriculture, of the Faculty of Science at Nancy. He at once organised the Agricultural Station of the East, the first of the kind opened in France. At the same time he started an active propaganda for the opening of similar stations all over the country, and he succeeded in seeing his ideas gradually realised. In 1881 he was appointed Inspector General of these stations, and did all in his power to increase their activity and usefulness.

During his first years at Nancy he devoted his time more especially to plant physiology. To those years belong his studies on the part played by the organic matter of the soil in the phenomena of plant nutrition, on the composition of leaves, on forest vegetation and on lichens, studies which he pursued alone or in collaboration with Fliche and Edmond Henry; his experiments on the influence of atmospheric electricity on plant nutrition and fructification belong also to this period.

At the same time he made lengthy experiments on the effect of manures on crops. A convinced partisan of the theories of Liebig with whom he had worked, his experiments led him to decide in favour of the use of mineral fertilisers, and he carried on an active propaganda in their favour. He was one of the first to demonstrate the value of basic slag, and contributed largely to generalise its use. Later on he was the first to introduce into France the use of nitrate of lime.

In 1872 the General Carriage Co. of Paris founded a laboratory for experimental enquiry into the best diet for horses, and Grandeau was asked to organize the laboratory and direct the investigations. No such institution then existed in France.

For several years laborious experiments were carried on uninterruptedly by Grandeau, which led to his publishing, first with A. Leclerc, and then with Ballacey and Alquier, important reports on the feeding of horses, on food substitutes, on the value of oats etc., studies of great value, not only to the Company which encouraged these experiments, but to all owners of horses.

Grandeau was always an enthusiastic student of questions concerning human and animal dietetics, which he pursued with ardour until the end of his life. When Chauveau demostrated the part played by sugar in nutrition, he became the most ardent propagandist of a method the value of which he had investigated.

In spite of the variety of his labours, Grandeau never neglected his work as promoter and director of the agricultural stations. He published for their use his famous treaty on the analysis of agricultural substances; which immediately became a laboratory classic, and was translated into German and Italian.

His career as a professor was no less fruitful than as a man of science. At 25 he was professor of chemistry to the Philotechnic Associations for the free education of the workers of the City of Paris. For twenty years he was Professor in the Faculty of Science at Nancy, where he held the position of *doyen* for ten years. During this same period he was Professor of Agriculture at the National School of Forestry. When he left Nancy to settle in Paris, Lecouteux soon called on him to be his substitute in the Chair of Agriculture of the National Conservatory of Arts and Trades ; and a few years later Grandeau became his successor, holding this chair till last year, when illness compelled him to designate Mr. Schribaux as his substitute.

He was attracted to journalism in his youth and never gave it up. In 1861, when only thirty years of age, he entered the staff of the *Temps*, which was founded in that year, and always

continued his connection with that great paper. For many years he regularly published agricultural reviews which aroused great attention.

The agricultural press also claimed his attention. In 1867 he became one of the most popular contributors to the *Journal d'Agriculture Pratique*; in 1893 he succeeded Lecouteux as Editor.

In 1884 Grandeau founded the *Annales de la Science Agronomique française et etrangère*. His aim was to provide an organ for the agronomical stations, and to make known in France the work done in other countries. With the same end in view he promoted and directed in 1881 and 1889 International Congresses of agricultural Stations in which the high esteem in which he was universally held was made evident.

The general report on agriculture at the Exhibition of 1900 was entrusted to him, and he transformed this report into a complete and thorough study of the agricultural institutions of the whole world up to the close of the 19th century. This masterpiece is a real monument to the agricultural science of our day; it does honour to France and to the author. On this occasion his colleagues of the National Society of Agriculture conferred on him the great gold medal only awarded for exceptional merit.

Agriculture.

Agricultural Physics, Chemistry, and Botany

2439 C. GRIMME. **Composition of the Seeds of Leguminous Plants grown in Togo and German East Africa.** (Untersuchungen der wichtigsten in Togo u. Deutsch-Ostafrika kultivierten Hülsenfrüchten). (*Zeitschr. Untersuch. Nahr. Genussm.*, 1911, 21 B. H 9. Pp. 547-553. Berlin, 1 Mai 1911. — *Analyst*, Vol. XXXVI, No. 424, p. 345. London, July, 1911.

Togo. German E. Africa

The seeds of the different plants in the following table are largely grown as food products in Togo and German East Africa :

NAMES	Water	Proteins	Fat	N. Free Extract.	Crude fibre	Ash
	%	%	%	%	%	%
Cajanus indicus, (1) « Pigeon pea	11.23	20.00	1.22	58.78	5.38	3.39
Phaseolus Mungo, « Mungo bean »	10.10	23.15	0.79	57.75	4.48	3.85
Phaseolus vulgaris, Bean .	13.23	18.62	1.69	58.34	3.01	5.11
» *lunatus*, « Moon bean »	13.70	21.13	0.91	57.06	3.61	3.59
Phaseolus var. *albomaculatus* « Moon bean »	12.92	16.71	1.00	63.16	3.20	3.01
Phaseolus inamaenus . . .	12.98	22.58	1.26	55.69	4.05	3.44
Dolichos Lablab, « Lablab bean »	10.20	25.66	0.78	53.95	5.87	3.54
Vigna Catjang (14 varieties) « Vigna bean »	11.31 to 12.63	17.80 to 28.05	0.86 to 4.33	53.35 to 65.13	2.13 to 4.72	2.89 to 3.69
Canavalia ensiformis, « Fetish bean »	12.95	26.43	2.81	48.92	6.64	2.25
Voandzeia subterranea, « Angola pea » (5 Varieties) .	10.94 to 11.84	17.07 to 24.70	5.70 to 6.44	49.44 to 57.60	5.39 to 7.17	2.52 to 2.80

(1) *Cajanus indicus*. Extensively cultivated throughout India. DE CANDOLLE views it as more probably a native of tropical Africa. The green pods, the grains and the flour are used as food. The leaves are considered excellent fodder for

Chemistry of Linseed. — *The Chemist and Druggist.* Vol. LXXIX, No. 1650. p. 46. London, September 9, 1911. **2440**

The Chemical Department of the School of Agriculture, Cambridge, has been engaged for the last three years (says the "Journal of the Board of Agriculture" 1911), in an important investigation of the properties of the protein of linseed. It is expected that a method will be devised which will shorten in a very marked degree the time required for research of this nature. The routine methods of hydrolysis, esterification, and separation of the amino acids have required, in the case of linseed, nearly two years of continuous work. It is hoped that the new method, when perfected, will shorten the work of protein analysis very considerably. The

Great Britain: England: Cambridge

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cattle. According to A. H. CHURCH *Food Grains of India*, a pound of the pea would contain 1 oz, and 361 grains of water, 3 oz. and 208 grains of albuminoids, and 9 oz and 11 grains of starch. Nutrient ratio about 1 : 3 ; nutrient value 80. According to BADEN POWELL, *Panjab Products*, I, 243, 100 parts of this pulse contain : — 22,45 to 24.55 of nitrogenous matter ; 60.52 to 60.81 of starchy matter ; 0.81 to 2.15 of fatty or oily matter.

G. WATT. *A Dictionary of the Economic Products of India.* Vol. II, p. 14-15 London-Calcutta.

The *Phaseolus Mungo* is a native of India. It is met with, both wild and cultivated, throughout the plains, ascending to 6.000 feet (2.000 metres) in the outer ranges of the North-West Himálaya. There are 3 well-marked varieties having respectively green, yellow and black seeds. The green pods are eaten as a vegetable. The pulse is a valued food for cattle und horses. The crushed stalks and leaves are useful as fodder. According to CHURCH a large number of analyses have been made of the different forms of *múng* without disclosing any decided difference in chemical composition. One hundred parts contain : — water 10.8 to 11.4 ; albuminoids, 22.2 to 23.8; starch, 54.1 to 54.8; oil 2.7 to 2.9 ; fibre, 5.8 to 4.2 ; ash, 4.4 to 3.8. The former figures are for typical green-seeded *múng*, the latter for typical yellow-seeded. In unhusked beans the fibre is reduced to 1.1 per cent ; all the other constituents being proportionately increased. Watt *l. c.* Vol. VI, Part I. pp. 189-191.

Phaseolus lunatus (Syn. *Ph. inamoenus*) Very commonly cultivated throughout India for use as a vegetable. According to DE CANDOLLE it is a native of Brazil, and is believed to have come to India originally from the Mauritius. A white-beaded form from Mysore was analysed by CHURCH with the following result : — Water, 13.3 ; albuminoids, 19.7 ; starch, 57.8 ; oil, 1.2 ; fibre, 4.3 ; ash 3.7 per cent. This species sometimes exhibits markedly poisonous properties. (Cp. WATT. A *Dictionary of the Economic Products of India.* Vol.VI, Part 1, p. 187)

Dolichos Lablab. Wild and cultivated throughout India. The green pods are eaten as a vegetable, the ripe seeds are employed as a pulse or as cattle food,

part played by the mucilage in linseed is also being investigated. It appears that this substance is not affected by the digestive juices, but under the action of bacteria is split up in the small intestine into substances which may be of use in the animal economy (1).

2441 GORTER. **The Chemical Composition of Coffee.** (Sur la composition chimique du café). — *Journal de Pharmacie et de Chimie*, No. 2, p. 73-74. Paris, 16 Juillet, 1911.

Mr. Gorter has shown that the active principle of coffee is chlorogenate of potassium and of caffeine.

France He has prepared a large quantity of this salt from Liberian and Arabian coffee, so as to make a closer study of chlorogenic acid, which he extracted from the coffee-leaves and from the seeds of *Capsia flavida*, *Helianthus annuus* and *Strychnos nux vomica*.

Chlorogenic acid melts at 200 C°. ; treated in an acoholic solution with acetate of potassium and caffeine, it produces, chlorogenate of potassium and of caffeine as found in coffee.

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and the stems constitue a valued fodder. The composition of Lablab beans is as follows :

	In 100 parts	
	Husked	With husk
Water	12.1	12.1
Albuminoids	24.4	22.4
Starch	57.8	54.2
Oil	1.5	1.4
Fibre	1.2	6.5
Ash	3.0	3.4

The nutrient ratio is 1 · 25 ; the nutrient value is 80.

A. H. CHURCH. *Food Grains of India*) Cp. WATT. *l. c.* Vol. III, p. 190).

Vigna Catiang. Native, but also cultivated in the hotter parts of India. The leaves are said to be employed as a dye-stuff in Bengal. The grain is eaten as flour, or *split*. The green pods are eaten as a vegetable. The stalks and leaves are useful as fodder. One hundred parts of the husked bean contains, water, 12.5 parts ; albuminoids, 24.1 ; starch, 56.8 ; oil, 1.3 ; fibre, 1.8 ; and ash 3.5, of which 1.0 consists of phosphoric acid (CHURCH). Cp. WATT, *l. c.*, Vol. VI. Part IV, pp. 237 — 238.

Canavalia ensiformis is found wild or cultivated throughout the eastern part of India from the Himálaya to Ceylon and Siam. The half-grown pods are used as food. The nutrient ratio of this pulse is 1 : 2.2 and the nutrient value 80 (G. WATT. *l. c.* Vol. II, p. 97)

(1) See Abstr. 1640 *Bullelin*, June, 1911.

2442 WILLIAM B. ALWOOD. **Enological Studies. The Occurrence of Sucrose in Grapes. The Sugar and Acid Content of Different Varieties of Grapes, Sampled at Frequent Intervals during Ripening and at Full Maturity.** — *U. S. Department of Agriculture - Bureau of Chemistry - Bulletin*, No. 140, p. 7, Washington, 27 May, 1911.

It has hitherto been generally believed that sucrose does not occur in grapes. As no actual data have been obtained on investigations made in enological laboratories outside the United States, dealing specifically with the point, the following observations will be of interest.

United States

H. C. Gore, in an article on the composition of Scuppernong, Concord, and Catawba grape juices, etc., notes the occurrence sucrose in two of the three kinds of Scuppernong grapes analyzed. There was 0.07 per cent. in one variety and 1.90 per cent in another when treated by inversion and reduction in the usual manner. The presence of sucrose in these samples of Scuppernong grapes was confirmed by examination with the polariscope and by the use of invertase.

Mr Gore also reports polariscopic readings on other grape juices, namely, Concord and Catawba, which indicate the presence of sucrose, but none was recovered from these varieties by inversion and reduction.

Mr Gore seems to have been the first to note the occurrence of sucrose in the fruit of a species of *Vitis*, and the report under review records the first discovery of sucrose in the varieties of the group commonly cultivated in the Eastern and Central States, namely, the Labrusca type, to which Concord, Catawba, and many of the best known grapes belong.

On September 8, 1909, while making some preliminary examinations of grapes at Sandusky, Ohio, a very attractive looking fruit, quite sweet, with a mild, pleasant flavor and low acidity, was found at a local store. The analysis, made in the usual manner, without inversion, showed that this fruit contained a very large proportion of non-sugar solids, and this fact suggested examination for sucrose, when no less than 6.6 % was found.

The fruit was traced to a vineyard at Venice, Ohio, about 3 miles west of Sandusky. Inspection being kindly allowed, the vines appeared to lack vigor, the growth was uneven, and, though quite heavily hung with fruit, the bunches varied much in character and set. The plant appeared to be an important new variety, if

it could be successfully grown. Inquiry led to the conclusion that it was probably a chance seedling.

Other varieties were then examined, and sucrose varying from 1.23 % to 9.34 % was found in the well-known Hayes, Worden and Pocklington.

The discovery of sucrose in such large quantities in these varieties of cultivated grapes led the Chief of the Bureau of Chemistry to cause samples to be furnished in 1910 to the Sugar Laboratory at Washington, so that an independent check might be made on the results already obtained at the Sandusky Laboratory, and also on the additional analyses to be made in the enological investigations during 1910.

The examinations of the seedling grape in 1909 and 1910 covered the period from the date it became barely edible, until it was over-ripe, in each case a period of 22 days. The total sugar content in the analysis of the fresh fruit, varied about 3 per cent in the first year and about 5 per cent in the second year. The ratio of reducing sugar to sucrose content varied from 1 : 0.80 to 1 : 1.04 in 1909 and from 1 : 1 to 1 : 1.19 in 1910, thus showing a fairly constant proportion between these two forms of sugar. The total acid content decreased about one-third in each year during the period the variety was under examination.

During the season of 1909, only one sample of Hayes and two each of Pocklington and Worden were examined at the Sandusky Laboratory. All of these showed a large amount of sucrose, hence in 1910 it was decided to examine these varieties more carefully, but only one sample of Hayes could be procured, as it is not grown to any extent. Of Pocklington and Worden, however, many samples were obtained from the Stenk vineyard at Venice, Ohio, and of the Worden grapes several additional samples from widely separated points were also analyzed. Analysis in every instance confirmed the results obtained in 1909, and showed that neither in the case of the seedling nor of these well-known varieties, did sucrose occur in greater quantities at any given period of maturity. In fact, the variations in the amount of sucrose obtained from the same variety of grapes at different dates are quite irregular. This fact does not admit of explanation by the conclusions so far reached, but as the analysts checked the results carefully, it is believed that they are correct.

ROSENTHALER and SCHAEFFER. **Composition of Sweet Apricot Kernels.** (Pharm. Zentralbl. 1911, 52, 507-508; through Chem. Zentralbl., 1911, II, 35) Abs: *The Analyst*, Vol. XXXVI, No. 426, p. 450, Sept. 1911. London. **2443**

Messrs Rosenthaler and Schaeffer have examined specimens of edible apricot kernels obtained from the south of France; these had a pleasant, almond-like taste quite different from that of the bitter kernels imported from Japan, Their composition was as follows: Water, 4.33, oil, 53.40; crude fibre 4.76; ash 2.60; total soluble matter 27.87; reducing sugars 8.08; reducing sugars after hydrolysis 11.64; and proteins 31.4 per cent. The oil expressed from the kernels had the following physical and chemical properties; Sp. gr. at 15° C., 0.9182; (N) D 25° C,, 64.7; solidifying-point 14.5° C.; iodine value 95.03; saponification value 187.76; Reichert-Meissl value 0.96; insoluble fatty acids, 73.48 per cent. The oil was optically inactive. **France**

The fatty acids gave the following values; Solidifying-point 5.1° C.; (N) D 25° C., 53.7; iodine value, 98.41; mean molecular weight, 190.55. The oil yielded negative results with Halphen's, Baudouin's, Soltsien's, and Bechi's tests, the coloration developing gradually and fading in a few minutes. The elaidin test yielded a viscous mass.

M. J. SACK. **The Presence of Indol, Scatol, Oleodistearine, and other Products in Certain Plants.** (Présence d'Indol, Scatol, Oléo-distearine et autres produits dans quelques plantes). — *Journal de Pharmacie et de Chimie*, 103e année, 7e série, tome IV, No. 4. p. 173-174. Paris, 16 Août, 1911. **2444**

The writer has detected the presence of indol in the perfume of the blossom of *Citrus Aurantium, C. decumana, C. Japonica, C. limonum, C. nobilis, C. trifoliata, Coffea liberica, C. robusta, C. Abeokuta.* **Germany**

He has found scatol in the wood of a variety of *Nectandra*, probably *N. globosa.*

The fatty matter of the seed of *Mangifera indica* contains oleodistearine, fusible at 44° C. after recrystallisation, readily soluble in ether, but difficult to dissolve in alcohol.

The seed of a species of *Chrysophyllum*, similar to *Chrysophyllum cuneifolium*, on distillation yielded an extract containing hydro-

cyanic acid and benzoic aldehyde ; these two principles are not present in a free state in the plant.

Van Romburgh had already detected hydrocyanic acid in the leaves of *Passiflora quadrangularis*, *P. laurifolia* and *P. princeps* ; but he had not found benzoic aldehyde. Dekker detected hydrocyanic acid and acetone in the leaves of *P. caerulea*. The writer has again found these two latter substances in the unripe seed and the skin of the unripe fruit of *Passiflora foetida*, *P. laurifolia*, *P. quadrangularis* ; where they are present in combination, but disappear almost entirely when full maturity is attained.

2445 CHARTIN and COLIN (A. DIZ). **Anthocyanin in Crassulaceae.** (L'Anthocyane chez les Crassulacées). — *Revue Scientifique*, 9e année, 2e Sem. V. 7, p. 209. Paris, 12 Août, 1911.

Anthocyanin, as is known, is the name given to the red pigment which imparts a beautiful colour to autumn leaves. This pigment is found in the most varied species, and is localised in different parts
France of the plant. Messers Charlin and Colin record it in very young plants of the family of the Crassulaceae (*Revue génér. de Botanique*, Juin 1911), where it appears as a bright pink spot at the extremity of the root. Sometimes it only fills 4 or 5 cells at the tip, sometimes it spreads to the older cells, but it is always localised in the growing point of the root. Its existence at all events is only transitory and as the root lengthens, the colour fades and gradually disappears. This is therefore a fresh example of the production of anthocyanin in the main roots during the period of germination ; nevertheless the rootlets which appear subsequently on the main root may also be tinted red. The writers have noted that anthocyanin may form in young plants grown in absolute darkness, but in quantities below the average. Thus, though light and chlorophyllian assimilation play an important part in the intensive formation of anthocyanin, it may exist even without their intervention. Evidence from many quarters shows that the droduction of anthocyanin, is connected with the accumulation of sugar in the plant tissues ; for istance, according to Palladine, fragments of *Rumex* leaf, placed in a solution of saccharose, redden distinctly. But in the case of the Crassulaceae, a sugared solntion does not seem to increase the proportion of the pigment in the young plants kept in complete darkness.

GABRIEL BERTRAND & ARTHUR COMPTON. **The Effect of the Reaction of the Environment on the Activity of Cellase. A New Characteristic which Distinguishes it from Emulsine.** — *C. R. Ac. Sciences*, T. 156, No. 5, pp. 360-363. Paris, 31 Juillet, 1911. **2446**

Cellase is a diastase which attacks cellose, a disaccharide produced by the partial hydrolysis of cellulose.

Experiments have been made with an extract prepared from sweet almonds with a view to determining the conditions which best favour the activity of this new diastasic agent. When treated with water this extract gave a solution which was alkaline to helianthine and acid to phenolphthaline. **France**

Cellase acts best in the vicinity of natural reaction, and the addition of a very small quantity of acid or alkali paralyses its hydrolysing action on the disaccharide.

These results establish a new difference between cellase and the two diastases, amygdalinase and amygdalase, both usually designated as emulsine, and found with the latter in the extract prepared from sweet almonds. These two diastases only attain their maximum activity in a medium distinctly alkaline to phenolphthalein.

JEAN APSIT and EDMOND GAIN. **The Resistence of Peroxidiastases in Heated Seeds.** (Sur la résistance des Peroxydiastases dans les Grains chauffés). — *C. R. des Séances de la Soc. de Biologie*, No. 27, p. 287. Paris, 4 Août 1911. **2447**

It has already been shown that the diastasic property of grain offers greater resistance to the action of heat than the germinating property. Further investigations into the death of seeds show that the saccharifying diastases and the peroxidiastases of grain offer very different degrees of resistance to heat. **France**

Bordeaux wheat grain had to be heated to 160° C. for 30 minutes before the peroxidiastases were killed. Similar results were obtained by subjecting the grain to boiling water for the same length of time. The amylase in this grain had already been destroyed by water heated to 85° C. from 30 to 35 minutes.

Belotourka wheat, placed in boiling water for 20 minutes, showed the presence of peroxidiastases, as revealed by the usual colouring of guaiacum or guaiacol in the presence of oxygenated water. These seeds were also free from amylase, as proved by their inability to saccharify a sterilised starch mixture. The different degrees of resi-

stance offered by amylase and peroxidiastases of heated seeds shows the independence of these two diastases.

Conclusions: 1) The resistence of the peroxidiastases of wheat grain to heat is much more considerable than that of the saccharifying diastases;

2) the peroxidiastasic property is quite distinct from the properties attributed to amylase.

2448 ARMAND GAUTIER. **On the Mechanism of the Variation of Races and the Molecular Transformations which accompany these Variations.** (Sur les mécanismes de la variation des races et les transformations moléculaires qui accompagnent ces variations. Les rameaux basiliqués de Menthe poivrée). — *C. R. de l'Acad. des Sciences*, 2e Sem., T. 153, No. 11, pp. 531-539. Paris, 11 Sept., 1911.

There are some twenty known species of the genus *Vitis* with hermaphrodite flowers which are native to the old world, and about fifteen species with dioecious flowers, known as American vines.

France *Vitis vinifera europea*, which includes all French vines may be subdivided into nearly 2000 races.

Until 1878 it was thought that all the races of the same species of plant, however much they might differ in growth, form of branches or leaves, arrangement of the fruit and its richness in sugar or colouring matter, fertility, date of development, etc., were formed of the same proteinic, cellulose, colouring, amylaceous, and other matter. But careful examination of the pigmentation of the grapes of the European vine convinced the writer at that date that each variety of vine produced in the skin or pulp of its grapes a specific pigment, chemically differentiated for each separate race. The following is a comparative table of the formulae for each of the more important pigments:

Aramon vine	C 46	H 36	O 20
Carignan vine	C 42	H 40	O 20
Grenache vine	C 46	H 44	O 20
Teinturier vine	C 44	H 40	O 20
Gamay vine	C 40	H 40	O 20
Petit-Bouchet	C 45	H 38	O 20

Thus each vine has its specific pigment.

On examining the nature of each of these pigments the writer found that they were all constructed on a similar plan. They are all

weak multibasic acids, formed by the union of a trivalent radical with the three branches constituted by a polyphenol partially carboxilised (sometimes amidised), similar in composition to aurine or fuchsine. All these pigments, when subjected to hydrolysis, yield a phloroglucine and an aromatic acid special to each, but always similar in structure (protocatechic acid, hydroprotocatechic acid, caffeic acid, etc.).

Thus the cause which has led to the variety or race has also differentiated its pigment by acting on the lateral links of its molecule, without changing its general chemical structure, just as it has left untouched the general forms and characteristics of the species.

This points to the fundamental fact that in the vegetable kingdom, at least, the simple passage from one race to another, and still more the passage from one species to another, entails so profound an alteration in its nature that, with the exception of a few bodies which occur in most plants, (sugar, starch, and perhaps cellulose), all the bodies proper to the species or the family, such as tannin, pigments, essences, alcaloids, chlorophylls, etc., vary, whilst preserving the essential features which distinguish their chemical species.

These modifications, which are detected by analysis and weighing, of the specific, constitutive, elements of the plant, modifications which occur as soon as a change occurs in the variety, are proof positive of similar modifications which have occurred in the plasms which have produced these new principles. If the product varies, it means that the elements producing it have varied ; it is, indeed evident that any modification in the structure of the protoplasm must give rise to a modification in its functions and products. Thus external modifications in the plant, the race characteristics, are only the outward signs of invisible but actual modifications in the micellae to which the variations in the products bear witness.

Of course it is conceivable that if external conditions, such as temperature, light, special radiations, nutrition, use or atrophy of certain organs, etc., vary, some of the specific bodies of which the living organism is built up may disappear or be modified. Still one cannot understand how it is thus possible to pass from one body to another, for the change from one well defined chemical compound to another is always sudden, and there are no intermediate steps to bridge the change. Moreover, adaptation to environment can only produce very gradual and continuous effects ; whereas the symbiosis of living plasms, when possible, must result in sudden variations in the mode of acting of the resultant plasma, and consequently, of its products.

The coalescence of plant plasms, whether somatic or virulent, is much more potent than cross sexual fertilisation in associating species and producing new varieties. This coalescence, indeed, may

occur not only between quite different species, but sometimes between different genera, which could not be effected by pollination. The tomato (genus *Lycopersicum*) cannot be pollinated by the cayenne-pepper plant (genus *Capsicum*), but their two plasms can be made to coalesce and modify by means of grafting. The results obtained by L. Daniel with *Vernonia* (*Compositae*) and *Xanthium* (*Ambrosiaceae*) also led to variations unobtainable by fertilisation, which is impossible between different families or genera.

And what is more, the plasma which causes the modification of the plant may be brought by insects, microbes, and sometimes by the mycelia of fungi acting on the underground portion of the plant. (Marin Molliard).

On some perppermint plants (*Mentha piperita*) branches have been observed in which the infloresence resembles that of a kindred species, basil (*Ocymum basilicum*). These branches, which are known as basiled produce a dextrorotary essence of a peculiar odour, as distinct from the levorotary essence with its pepperminty smell produced by the rest of the plant. Now Messers Charabot and Ebray showed, in 1898, that this important variation in the peppermint plant is always caused by the puncture of an insect.

According to Mr. Marin Molliard the flowers of *Matricaria inodora*, when attacked by *Peronospora radii*, assume the appearance of the double flowers of the Radiatae.

The investigations made by Meehan and recorded by A. Giard, show that *Liatris* and *Vernonia*, when their roots are attacked by the mycelium of a fungus, become much branched and panicled with fasciated stalks. Their anthers are sterile, the pistil is intact ; and the plants change from hermaphrodite to unisexual.

Would it not seem that in this case we must look for a foreign virus or enzyme whlch (like the vaccine or typhus virus) modifies the plasms of the plant and its behaviour ?

We are led to the conclusion that the coalescence of living sexual or somatic plasms, acting by means of fecundation, grafting, parasitic or virulent symbioses, and sometimes, perhaps, by withdrawing the enzymes required for normal development, is the cause of the plasmatic and functional variations which give rise to most varieties, and undoubtedly also to most known species. Such modifications are sudden and not gradual ; they transform the constituent bodies of the new product. But far from being monstrous, the individuals and races thus produced do not as a rule exceed in their variations the limits beyond which analogies of anatomic forms disappear, and the specific bodies on which their plasms are built up, whilst undergoing modification, still preserve their general chemical structure.

G. Inghilleri. **Photochemical Synthesis of Hydro-Carbons.** (Synthèse photochimique des hydrates de carbone). — *Journal de Pharmacie et de Chimie*, 103e Année, 7e Série, Tome IV, No. 3, pp. 122-124. Paris, 1er Août, 1911. (Photochemische Synthese der Kohlenhydrate. *Ztschr. f. physiol. Chemie.* LXXI, p. 105, 1911). 2449

In February 1909 M. Inghilleri prepared three glass test-tubes each containing a solution of 12 gr. of pure oxalic acid in 203 cubic centimetres of formol solution at 40 %, and sealed them up; two of these tubes were exposed to the light, the third, wrapped in black paper, was placed in the dark. Italy

One of the tubes exposed to the light was opened at the end of May 1910 ; the other tube is still under observation.

The contents of the tube had not changed in appearance ; on opening it there was a slight explosion and a gas which was probably carbon dioxide, was given off ; the liquid was acid and the smell was that of formic acid.

On fractional distillation a pungent smelling liquid was obtained at 101° C.; then the temperature rose to 112°, and as the liquid began to colour, the distilling was interrupted. On cooling a certain number of crystals formed, consisting of a body possessing all the properties of a sugar; these crystals dissolve in water but are not readily soluble in alcohol. When heated in a closed tube they turn a dark, red colour, and give off products which smell like caramel.

Summarising results, a real synthesis took place in the tube exposed to the light. The molecules of formic aldehyde CH^2O, combined to form a *monose* $C_6H_{12}O_6$.

P. Q. Keegan. **Notes on Plant Chemistry. Nitrates and Chlorides.** — *The Chemical News*, Vol. 104, No. 2702, pp. 109-110. London, September 8, 1911. 2450

Far too little attention has been paid to the highly suggestive remark of **M.** Pichard (*Comptes Rendus*, 1899, CXXVIII, 615) to the effect that " the presence of chlorides in soil and their tendency to be absorbed by plants is antagonistic to the taking up of nitrates: and it is only owing to their predominance in the soil that nitrates can be absorbed; their diminution in the soil gives rise to increased absorption of chlorides ". The following table, compiled from Mr. Keegan's own analyses, may be interesting in this connection. The Great Britain

mycorhiza plants here mentioned contain no nitrates. The figures represent the percentage of chlorine in the crude ash minus charcoal:

Mycorhiza plants		Nitrate Plants	
Wild hyacinth leaves	28.0	Nettle	2.9
Bog asphodel	17.5	Bogbean	1.2
Lesser celandine	12.8	Vetch	2.2
Daffodil	0.8	Reed	4.0
Primrose	17.2	Cow parsnip	2.5
Ramsons	21.2	Cleavers	3.9
Wood anemone	12.0	Willowherb	3.2
		Shepherd's purse	4.2

The above may be regarded as examples of extreme cases, and for the most part refer to the leaves of plants growing in meadows, open woodlands, or waste places. It does not, however, seem invariably to follow that a mycorhiza plant should take up a large dose of chlorine, *e.g.*, valerian has mycorhiza with 4.3 chlorine, gorse ditto with 2.7 chlorine, cuckoo-pint 1.6; etc. But, on the other hand, certain nitrate plants, although they never absorb an excessive amount of chlorine, manage occasionally to appropriate a considerable amount; *e. g.*, foxglove will take up 7.3 to 10.4, potato 6.5, bracken 10, burdock 5.8, polypody 7.6, goosefoot 7.2, etc. These plants, however, mostly inhabit dry or sandy places. According to Malaguti and Durocher (1858), ordinary plants growing on the edges of fields, hedges and ditches have much chlorine, *i.e.*, in places where the soil nitrates are liable to be washed out. This explanation seems to account for the fact that the leaf ash of the common ragwort contains an unusual amount of chlorine, viz. 9.6 per cent, and the whole plant about the same; whereas groundsel contains less than 3 per cent. The latter is a strong nitrate plant.

2451 MAZÉ. **Investigations on the Formation of Nitrous Acid in the Plant Cell.** — *C. R. Ac. des Sciences*, T. 153, N. 5, pp. 357-360. Paris 31 Juin 1911.

Continuing his investigations, of which mention has already been made (1), the writer prepares the plant juice by subjecting it **France** to the following processes:

He precipitates the fresh juice by adding an equal volume of alcohol at 95° C.; he evaporates the filtered liquid at 30° C., under

(1) See Abstract 2073 *Bull.* July, 1911. (*Ed.*).

reduced pressure so as to free it from all alcohol; he filters through a Chamberland filter (bougie) and stores in sterilised phials, in contact with the air.

Of large seed plants which can be grown in the laboratory he prefers the pea; the stalks of peas, grown in Fontainebleau sand and watered with distilled water, are better suited for the purpose of such investigations the older they are.

Seedlings grown in the dark supply a more active juice than those which have been grown in the light of the laboratory. The juice of these etiolated plants contains 9.33 milligrammes of nitrous acid per litre, 24 hours after filtering.

The juices of young plants rich in reducing matter react perceptibly some hours after being filtered; the intensity of the reaction increases for some days, then declines, to increase again once more for several weeks; the maximum, which has never exceeded 1/50.000, keeps for several months; indeed the limit of time during which the capacity for reaction lasts has never been fixed. The presence of nitric acid in these juices has never been noted.

The juice of *mucedineae*, passed through a Chamberland filter (bougie), gives after a few days a positive reaction.

Living animal cells possess ths same property, as is shown by experiments made with the urine of healty men.

All these facts show that the production of nitrous acid by the cell is a general property; probably the nitrous acid is present in the cell in a combined form.

The writer thinks he can safely affirm that combustion caused by respiration is an oxydation of the albuminoid matter of protoplasm, due to a nitrous function probably connected with the albuminoid molecule itself.

PRIANISCHNIKOW and SCHULOW. **The Synthetic Formation of Asparagin in Plants.** (Sur la formation synthétique de l'asparagine dans les végétaux). — *Journal de Pharmacie et de Chimie*, No: 2, p. 76. Paris, 16 Juillet, 1911, and *Ber. bot. Gesellsch.* p. 253. **2452**

The writers subjected the sprouting roots of barley and pea-plants to the action of distilled water and a 1 % solution of ammonium chloride. They found that the formation of asparagin corresponded to the quantity of ammonia absorbed. The total nitrogen content was measured by Kjeldahl's method ; the nitrogen content of the albuminoids by Stutzer's method, the nitrogen content of the asparagin by Sachse's method, and the ammoniacal nitrogen **Russia**

by Bosshard's method, in the precipitate obtained with phosphotungstic acid. As the proteid content is constant, the writer excludes the hypothesis which considers asparagin as the product of the decomposition of albuminoids ; he is inclined to believe that it is produced at the expense of the ammonia.

The pea reacts more energetically than barley on the acids contained in the nutritive solution; hence in the experiments made by the writers with gemmules of the pea-plant a small quantity of carbonate of lime was added to the solution of ammonium chloride, so as to neutralise the hydrochloric acid which is given off when the ammonia is fixed.

The writers noted that salts of lime favour the germination of pulse, and, consequently, the formation of asparagin.

One of the writers (Schulow) has moreover made experiments in which he added to the solutions of ammonium chloride like quantities of sulphate of lime, so as to study the action of lime. By this means he was able to determine that not only carbonate, but also sulphate of lime favours the fixation of ammonia and the formation of asparagin at its expense. Thus plant, like animal ,organisms strive to prevent the injurious accumulation of ammonia. The writers believe that in both cases a process takes place by which the hydrogen is drawn off, transforming the ammoniacal salts into amid acids (asparagin or urea). They are thus led to the conlusion that there is a physiological connection between asparagin and urea.

2453 F. Rabak. **The Relation of the Odorous Constituents of Certain Plants to Plant Metabolism.** From the Office of Drug Plant, Poisonous Plant, Physiological and Fermentation Investigations, Bureau of Plant Industry, Department of Agriculture. — *The Journal of the American Chemical Society.* Vol. XXXIII. No. 7, pp. 1242-1247. Easton, Pa., July, 1911.

Mr. Rabak has studied the effect of the succession of the seasons on the volatile constituents of *Erigeron Canadensis* and *Mentha citrata*, and has determined the odorous constituents of *Mentha piperita*, of *M. citrata*, and of *Artemisia absinthium* at the time of flowering, as well as before and after.

United States

His researches show that :

1) In general the odorous constituents (ethers) of the oils of the above named plants do not appear to be affected by the plant's fructification.

It seems that in all cases there is a period during the development and growth of the plants, when, under certain favorable condi-

tions, the chemical functions of the plant transform some of its constituents into corresponding ethers and alcohols.

2) The constant formation of the ether compounds in proportion to the development of the plants is very clear. The percentages of free alcohols no longer seem to stand in close relation to the vital functions of the plant.

3) It appears probable that the odorous constituents formed in the plants are simply the excretion products which arise during the metabolism of the plant, and which are of no further use to it ; and that the plants only use these reserve products as a protection against injurious insects, from which aromatic plants are to a large extent free.

4) Plant metabolism is affected by changes in climatic conditions (succession of the seasons); also the effect of desiccation, and lastly the effect of the buds, of the flowers and of the fruit, on the vital functions of the plants bring about in each case changes in the aromatic constituents, but in no case was any consumption of the ether or alcohol constituents clearly observed.

C. v. SEELHORST. **The Importance of Water to Cultivated Plants.** 2454
(Die Bedeutung des Wassers im Leben der Kulturpflanzen). — *Journal für Landwirtschaft*, 59 Band, Heft III, pp. 259-291, Berlin, 1911 (1).

For the past 14 years the writer, with the assistance of his students, has been investigating, in the experimental fields attached to the University of Göttingen, the part played by water in the growth of cultivated plants. He now gives the results of his enquiries. The following are the chief facts established by his investigations : Germany

1. The quantity of water available for plants exercises a marked influence on the composition of the dry matter they contain.

2. The utilisation of water in the formation of dry matter depends not only on the plant itself, and upon the quantity and nature of the water available, but also on the amount of nutritive substances held in solution by that water.

3. The quantity of water available for the plant at different stages of its growth, exercises a marked influence on the development of the different organs, such as roots, branches, leaves, flowers, fruit, etc.

These experiments lead the writer to conclusions of special interest to the practical farmer in the matter of rotation of crops.

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(1) See Abstr., 404. *Bulletin*, Feb. 1911.

Rye takes less water from the soil than wheat. This is of great practical importance whenever green manures are to be grown after a cereal crop. It must be remembered that not only are green manures sown later after wheat than after rye, but also that they are sown on a drier soil, and therefore on one less suited to such a crop. Clover exhausts the moisture of the soil in the highest degree. Thus in dry years, a crop sown after clover will find the conditions of the soil unfavourable and will develop slowly.

Potatoes require the least water, and leave the sub-soil rich in moisture. They therefore leave the soil in a more favourable condition for subsequent crops, provided, that the getting in of the potatoes be not unduly delayed, and that nitrogen be added to the soil in a readily assimilable form.

Peas are another crop which absorb little moisture from the soil; oats, on the other hand, take up much.

As far as the moisture of the soil is concerned, it is better to grow wheat after rye than rye after wheat.

2455 PIERRE LESAGE. **On the Watering of Plants with Salt Water.** — *C. R. de l'Académie des Sciences*: Tome 153; No. 3, pp. 196-197. Paris, 17 Juillet, 1911.

Experiments made with garden-cress (*Lepidium sativum*) show that plants treated with salt-water are smaller, more fleshy and more yellowish than the controls treated with fresh water.

France Two interesting facts are to be noted. The first is that at the beginning of the treatment, and even after a certain time, the plants had a dark green colour as opposed to the delicate hue of the controls. It was only later on that the yellowish colour came out distinctly.

The second fact clearly shows how the chemical composition of the water applied affected the length of the plants' development. The development cycle of *Lepidium*, when treated with solutions of sea salt, was found to be shorter than when fresh water was applied.

2456 A. J. EWART and V. NIGHTINGALL. **The Influence of Radio-Active Minerals on Wheat.** — *Journal of the Dep. of Agric. Victoria*, Vol. IX, Part 3, pp. 155-157. Melbourne, March 10, 1911; Abstr. in *The Agricultural News*, Vol. X, No. 238, p. 183, Barbados, June, 1911.

Australia: Victoria The large amount of work that has been done already in connection with the matter has not taken cognizance, for the greater part,

of the kinds of radiation, or of the possible difference between the action of direct contact of the radium emanation from radium itself and from radioactive minerals. This probably accounts for some of the variations in results obtained by different investigators. (1)

The award of a Government research scholarship under the Department of Agriculture of Victoria has enabled definite work to be done on the subject during the past year. Before the results of this are given, attention is drawn to the fact that investigators have generally found that intense radiations of the kind cause the death of plants, while, when they are less intense, they bring about a stimulation of the growth, thus possessing much the same effect as plant poisons. The latter fact suggested that it would be of interest to determine: "whether the addition of small quantities of radioactive minerals to the soil would sufficiently stimulate the growth of such plants as wheat, for example, to make their use profitable on an agricultural scale". For this purpose, finely ground and strongly radioactive rock was applied to different plots of wheat singly, as well as in conjunction with superphosphate, and finely ground phosphate rock.

In the result, the plants on all the plots were slightly attacked by corn mildew (*Erisyphe graminis*), showing that the presence of a radioactive mineral in the soil does not afford protection to plants against parasitic fungi. In regard to the effect on the yield of wheat, the results are not concordant, and the experiments require repetition, but they seem to indicate that the presence of the radioactive mineral in fairly large quantities tends to increase the weight of the crop; the composition of the mineral shows that this effect could not be due to any manurial value that it may have possessed. The suggestive matter is that the greatest increase occurred where the seed was placed immediately upon the radioactive mineral. It is not possible, however, to draw definite conclusions from the re- experiments, so far. Enough has been indicated to show, nevertheless, that economically useful results may ultimately be obtained from experimentation of the kind.

PERCY GROOM. **Some Aspects of Periodicity in Plants.** — *Science Progress*, Vol. VI, No. 21, pp. 62-77. London, July, 1911. **2457**

The successive morphological changes that collectively constitute the ontogeny of an individual exemplify but one of the many **Great Britain**

(1) See Abstr. 735 *Bull.* March, 1911.

manifestations in protoplasm of periodic action, protoplasmic periodicity being often revealed in rhythmic physiological activity almost, or entirely, unaccompanied by appreciable change in structure. Rhythmic activity in the simple plant or cell may be automatic or induced, and is subject to modification by external factors. The length of periodic action varies from a fraction of a second, in a moving cilium, to days, months or years as represented by the longevity of a cell or organism.

The subject of longevity itself offers many problems for solution. In many species of plants varying from simple to the most complex, death is associated with a special form of reproduction (monocarpous types), The cause of death in polycarpous plants is quite unknown. It is certain that isolated plant cells and organs, for example, sexual cells, pollen grains and seeds, perish naturally, that is to say, unattacked by parasitic foes.

Some interesting experiments conducted by Giglioli provide the first steps towards solution of the problem of death in seeds. Giglioli kept resting seeds in hermetically sealed tubes that contained various dry gases, including such poisons as chlorine, arseniuretted and sulphuretted hydrogen and carbon monoxide, also in poisonous alcoholic solutions, including absolute alcohol and corrosive sublimate. He showed that seeds (especially those of *Medicago sativa*) could live in these poisonous surroundings during the whole time of his experiment, namely fifteen to sixteen years, but that even small traces of water led to the death of the seeds. These experiments prove, on the one hand, that dry seed-coats may be impervious to dry gases and to alcoholic solutions ; on the other, that seeds can live for years under conditions that almost or entirely exclude respiration (except in the form of infinitesimal intramolecular respiration).

These observations, together with those of P. Becquerel, Dörber and Nobbe, suggest that the death of seeds exposed to the air is due to access of water and oxygen.

The rhythmic morphological activity of phanerogams is expressed in the succession of different kinds of leaves not only in the life of the annual individual, but also in the growth of the perennial during one season, when foliage is succeeded by scales and by flower and fruit.

This periodicity is largely innate. Yet external factors can affect the rhythm by modifiying the times of commencement and conclusion and the duration of the cycle, so that the phenology of a species varies within limits as the site, latitude and altitude. The growth in length of trees is governed by an innate periodicity, and

the period of maximum growth in length coincides neither with maximum temperature of soil or air, nor with the maximum supply of humidity, nor with any combination of these.

This has been clearly shown by Dr. D. Christison. He showed also that the periods of elongation and thickening do not synchronise either in duration or in phase.

The exact time at which the several parts of the annual ring are produced has been investigated by several botanists who have demonstrated *inter alia* that the term "autumn wood" conveys a false impression. The transition from spring to autumn wood in the oak is effected about the middle of June and in conifers the autumn wood is generally initiated about the middle of August. Harting found that in beeches, fifty to 150 years old, the following fractions of the annual ring were produced; one third up to the middle of June, half up to the middle of July, three-quarters up to the end of July and that the ring was complete at the middle of August.

The periodicity revealed in the production of annual ring is known to be innate. Annual rings are most marked in deciduous species and are sometimes distinct in evergreens, (as in man yconifers and some oaks); where they are unrecognisable, the species is evergreen.

Finally, it may be pointed out that the growth in height and in thickness of the tree, as a whole, follows a waxing and waning rhythm, so that the successive annual rings, traced from the centre, at first widen and subsequently narrow until they become approximately constant in thickness.

W. Bateson, **Investigation of the Nature of Variation in the Size of the whole Organism or of its Parts.** — *Nature*, Vol. 87, No. 2186, p. 404. London, 21 September, 1911 (Extract from the Opening Address to the Agric. Subsection. Meeting of Brit. Assoc. Portsmouth, Sept. 1911. 2458

« I know few lines of pure research more attractive and, at the same time, more likely to lead to economic results than an investigation of the nature of the variation in size of the whole organism or of its parts. By what factors is it caused? By what steps does it proceed? By what limitations is it beset? In illustration of the application of these questions I may refer to a variety of topics that have been lately brought to my notice. In the case of merino sheep I have been asked by an Australian breeder whether it is pos- Great Britain: England

sible to combine the optimum length of wool with the optimnm fineness and the right degree of crimping. I have to reply that absolutely nothing is yet known for certain as to the physiological factors determining the length or the fineness of wool. The crimping of the fibres is an expression of the fact that each particular hair is curved, and if free and untwisted would form a corkscrew spiral, but as to the genetics of curly hair even in man very little is yet known. But leaving the question of curl on one side, we have, in regard to the length and fineness of wool, a problem wh.ch genetic experiment ought to be able to solve. Note that in it, as in almost all problems of the "yield" of any product of farm or garden, two distinct elements are concerned — the one is *size*, and the other is *number*. The *length* of the hair is determined by the rate of excretion and length of the period of activity of the hair follicles, but the fineness is determined hy the number of follicles in unit area. Now analogy is never a safe guide, but I think if we had before us the results of really critical experiments on the genetics of size and number of multiple organs in any animal or even any plant, we might not wholly be at a loss in dealing with this important problem.

A somewhat similar question comes from South Africa. Is it possible to combine the qualities of a strain of ostriches which has extra long plumes with those of another strain which has its plumes extra lustrous? I have not been able fully to satisfy myself upon what the lustre depends, but I incline to think it is an expression of fineness of fibre, which again is probably a consequence of the smallness and increased number of the excreting cells, somewhat as the fineness of wool is a consequence of the increased number and smallness of the excreting follicles.

Again the question arises in regard to flax, how should a strain be bred which shall combine the maximum length with maximnm fineness of fibre? The element of number comes in here, not merely with regard to the number of fibres in a stem, but also in two other considerations; first, that the plant should not tiller at the base, and, secondly, that the decussation of the flowering branches should be postponed to the highest possible level.

Now in this problem of the flax, and not impossibly in the others I have named, we have questions which can in all likelihood be solved in a form which will be of general, if not of universal, application to a host of other cognate question. By good luck the required type of flax may be struck at once, in which case it may be fixed by ordinary Mendelian analysis, but if the problem is investigated by accurate methods on a large scale, the results may

show the way into some of those general problems of size and number which make a great part of the fundamental mystery of growth.

I see no reason why these things should remain inscrutable. There is indeed a little light already. We are well acquainted with a few examples in which the genetic behaviour of these properties is fairly definite. We have examples in which, when two varieties differing in number of divisions are crossed, the lower number dominates — or, in other words, the increased number is a consequence of the removal of a factor which prevents or inhibits particular divisions, so that they do not take place. It is likely that, so far as the increased productivity of a domesticated form as compared with its wild original depends on more frequent division, the increase is due to loss of inhibiting factors. How far may this reasoning be extended? Again we know that in several plants — peas, sweet peas, Antirrhinum and certain wheats — a tall variety differs in that respect from a dwarf in possessing one or more factors. It would be an extraordinarily valuable addition to knowledge if we could ascertain exactly how this factor operates, how much of its action is due to linear repetition, and how much to actual extension of individual parts. The analysis of the plants of intermediate size has never been properly attempted, but would be full of interest and have innumerable bearings on other cases in animals and plants, some of much economic importance.

That in all such examples the objective phenomena we see are primarily the consequence of the interaction of genetic factors is almost certain.

Critical intelligence may for an indefinite time be satisfied that there is no specific problem to be investigated, in the same facile way that, till a few years ago, we were all content with the belief that malarial fevers could be referred to any exhalation in the atmosphere, or that in suppuration the body was discharging its natural humours. In the economics of breeding, a thousand such phenomena are similarly waiting for analysis and reference to their specific causes. What, for instance, is self-sterility? The phenomenon is very widely spread among plants, and is far commoner than most people suppose who have not specially looked for it. Why is it that the pollen of an individual in these plants fails to fertilise the ova of the same individual? Asexual multiplication seems in no way to affect the case. The American experimenters are doubtless right in attributing the failure of large plantations of a single variety of apples or of pears in a high degree to this cause. Some times, as Mr. W. O. Backhouse has found in his work on plums, at the John Innes Horticultural Institution, the behaviour of the varieties is most definite and specific. He

carefully self-fertilised a number of varieties, excluding casual pollination and found that while some sorts — for example, Victoria, Czar, and Early Transparent — set practically every fruit self-pollinated, others, including several (perhaps all) Greengages, Early Orleans, and Sultan do not set a single fruit without pollination from some other variety. — Dr. Erwin Baur has found indications that self-sterility in Antirrhinum may be a Mendelian recessive, but whether this important suggestion be confirmed or not, the subject is worth the most minute study in all its bearings. The treatment of this problem well illustrates the proper scope of an applied science. The economic value of an exact determination of the empirical facts is obvious, but it should be the ambition of anyone engaging in such a research to penetrate further. If we can grasp the *rationale* of self-sterility we open a new chapter in the study of life. It may contain the solution of the question What is an individual? — no mere metaphysical conundrum, but a physiological problem of fundamental significance.

What, again, is the meaning of that wonderful increase in size or in « yield » which so often follows on a first cross? We are no longer content as Victorian teleology was, to call it a " beneficial " effect and pass on. The fact has long been known and made use of in breeding stock for the meat market, and of late years the practice has also been iutroduced in raising table poultry. Mr. G. N. Collins of the U. S. Department of Agriculture, has recenrly proposed with much reason that it might be applied in the case of maize. The cross is easy to make on a commercial scale, and the gain in yield is striking, the increase ranging as high as 95 %. These figures sound extravagant, but from what I have frequently seen in peas and sweet peas, I an prepared for even greater increase. But what *is* increase? How much of it is due to change in number of parts, how much to transference of differentiation or homoeosis, as I have called it — leaf-buds becoming flower-buds for instance — and how much to actual increase in size of part? To answer these question would be to make an addition to human knowledge of incalculably great significance.

In the application of science to the arts of agriculture, chemistry, the foundation of sciences, very properly and inevitably came first, while breeding remained under the unchallenged control of simple common sense alone. The science of genetics is so young that when we speak of what it also can do, we must still, for the most part, ask for a long credit; but I think that if there is full co-operation between the practical breeder and the scientific experimenter, we shall be able to redeem our bonds at no remotely distant

date. In the mysterious properties of the living bodies of plants and animals,there is an engine capable of wonders scarcely yet suspected, waiting only for the constructive government of the human mind. Even in the seemingly rigorous tests and trials which have been applied to living material apparently homogeneous, it is not doubtful that error has often come in by reason of the individual genetic heterogeneity of the plants and animals chosen. A batch of fruit trees may be all of the same variety, but the stocks on which the variety was grafted have hitherto been almost always seminally distinct individuals, each with its own powers of luxuriance or restriction, its own root-systems, and properties so diverse that only in experiments on a colossal scale can this diversity be supposed to be levelled down. Even in a closely bred strain of cattle, though all may agree in their « points », there may still be great genetic diversity in powers of assimilation and rapidity of attaining maturity, by which irregulatities by no means negligible are introduced. The range of powers which organic variation and genetic composition can confer is so vast as to override great dissimilarities in the conditions of cultivation. This truth is familiar to every raiser and grower, who knows it in the form that the first necessity is for him to get the right breed and the right variety for his work. If he has a wheat of poor yield, no amount of attention to cultivation or manuring will give him a good crop. An animal that is a bad doer will remain so in the finest pasture.

The student of the conditions of life, can do, and has done, much for agriculture, but the breeder can do even more ».

A. WORSLEY. **Variation as Limited by the Association of Characters.** 2459
Journal of the Royal Horticultural Society, Vol. XXXVI, Part III, pp. 596-602. London, May 1911.

The writer has experimented with several fertile hybrids and analysed the variations which take place in the ensuing generations; and in most of these experiments, he found that the hybrids and their self-fertilized progeny are means between their parental extremes, although there are instances in which one parent influences the hybrid and its progeny to an extent exceeding that of the other parent. **Great Britain: England**

When the writer has followed the hybrid progeny by critical analysis into the second and subsequent generations he has not been able to statisfy himself that reversion to certain specific characters follows the allegations of the Mendelian advocates.

In the first place, he has never been able to find in hybrids any characters that were absolutely dominant or recessive, but has only discerned a certain relative or partial inclination towards the specific characters. Nor has he as yet found a single instance of absolute reversion to either specific type; but he has found that, in the subsequent generations, all sorts of intermediate forms crop up equipoised between the hybrid type and either parent.

We constantly find that certain pairs of characters cannot be dissociated from each other, but continually occur together in individuals.

This association of certain characteristica (so long as it obtains) appears to rule out the possibility of the occurrence of certain conceptually possible intermediate forms.

If we define a species as "A group of closely related individuals as between whom procreative variation has suffered a temporary and partial arrest", variation becomes a question of permutations and combinations and in every "good" species all the characters hang together so that variation is brought to a stand still for the time being, or reduced within very narrow limits.

By hybridization this fixity is broken up to some extent, or, in a few cases, a new set of associated characters supersede the old associations. Now if the hybrid, is crossed with another hybrid, greater variation becomes evident, until in florists' plants we note an evergrowing inconstancy. All this hypothetical fixity in "good" species is, however, relative and not absolute.

There exists a certain percentage of variant from the type, and in the writer's opinion we cannot foretell with certainty the trend of such variation. For as the germ-plasm of every plant contains within itself immeasurable possibilities of reversion to all or any of its ancestral characters, however remote, it is clear that the apparent fixity of any species is a something bounded by time and conditions. For the time, variation is bounded by the association of certain characters, but how or when this association will be broken, or what variation or reversion may then ensue, cannot be foretold.

Instances of linked characters were observed by the writer and are described for following genera: *Chrysanthemum*, *Hymenocallis*, *Papaver*, *Hippeastrum*, *Capsicum*, *Matthiola* and 30 genera of Amaryllideae. Mr. Sutton observed linked characters in garden forms of *Primula sinensis*. Hugo de Vries in his book *Plant Breeding* gives a number of instances of correlation of characters.

The writer has noted many cases in which parthenogenic reproduction of highly bred plants has been associated with the pro-

duction of ancestral types of perianth in the progeny, that the changes in the means of reproduction to an asexual condition has been associated with a carrying back of the perianth to the condition of some remote ancestor. In other words, that these characters are associated.

T. Burtt-Davy. **Observations on the Inheritance of Character in *Zea mais*** (1). *Royal Society of South Africa*, May 19. — *Nature*, No. 2178, Vol. 87, p. 136, July, 27, 1911. London. **2460**

In Red Cuzco and some other breeds of red maize, the red colouring matter is confined to the pericarp, and is therefore a fruit character; it does not appear in the first cross between a white male and a red female. In a Red Dent breed the red pigment occurs in the aleurone layer; it is therefore a seed character; it is dominant to whiteness. When this breed is crossed with a white sugar breed the results in the second generation are approximately: Red: starchy, 56.25 per cent.; sugary, 18.75 per cent. = 75 per cent. White: starchy, 18.75 per cent.; sugary, 6.25 per cent. = 25 per cent. A single grain has been seen, in which the starchy character appears in one half, the sugary character in the other. **South African Union**

The number of rows on a maize ear, within certain limits, is subject to fluctuating variations, which may perhaps be affected by season or food supply, or both. When an eight-row type is crossed with an eighteen-row type, both characters disappear in the heterozygous form, and an intermediate type is produced, in which there are 10, 12 or 14 rows; 12 rows greatly predominating. A white-cobbed breed crossed with a red-cobbed produces a red-cob in the first filial generation. The result of the reciprocal cross is the same.

R. P. Gregory. **Inheritance in *Primula sieuesis*.** — *Nature* No. 2175, Vol. 87, p. 18. London, July 6, 1911. **2461**

Inheritance of heterostylism and colour in *Primula sinensis* have provided the subject of extensive experiments by Mr. R. P. Gregory, who presents his latest results in *The Journal of Genetics* (vol. I, No. 2). Colour has to be considered independently for the flowers and stems; when absent from the flowers they are white, and when absent from **Great Britain**

(1) See Abstr. 1654, *Bull.* June 1911. (*Ed.*).

the stems they are green. Colour may also be distinguished as full or pale. Full-coloured flowers are only produced on deeply coloured stems, although in the horticultural class « Sirdar », where the petals are full-coloured but the pigment occurs in dots, the stems are green. Full-colours are dominant to pale; magentas are dominant to reds, and both colours to blue; whites may be dominant or recessive to colours.

2462 GRIFFON. **Development of an Almond Tree Branch on a Peach Tree. Singular Case of Variation.** *Comptes rendus de l'Académie des Sciences*, 4 Septembre, 1911.

In 1908 it was found that an almond tree branch had developed at the top of a main bough, of a peach tree, at an angle of a crown at a distance of more than two metres (6.56 ft.) from the point of grafting. In 1910 on the same tree some almond shoots appeared near the first, **France** and then on a lower main bough, at the same time as the peach shoots; and lastly also on another neighbouring tree, shoots of almond appeared.

The peach trees presenting these unexpected variations are trained on an espalier and grafted on almond trees; they are from 60 to 80 years old, and show signs of decay ; they are near an old variety much cultivated at Montreuil, the *Grosse Mignonne*. One branch was in flower at the end of March 1911, with real almond blossoms; they were white, and larger than those of the stock peach, which are of a bright rose colour. The fruit which formed resembled long almonds, but they fell as soon as they reached the length of from 1.5 to 2 cm. (.59 to.78 in).

How are these cases to be explained ?

At first they were thought to be almond grafts, which for several years had been dormant, and had then developed in consequence of the trees getting old, or from certain meteorological circumstances. Another idea was that a specific influence of the stock made itself felt on the graft at an advanced age. Others maintained that the peach trees, where this curious case was noticed, perhaps have come from grafts on a hybrid sprung from a chance seedling, so that the advent of the almond would be nothing more than a return to one of the parents. Lastly, there are those who incline to the old view, that the peach tree is nothing but a cultural form of the almond. This would imply that on the two trees in their old age at Montreuil, certain shoots acquired, through atavism, the almond character.

To come to any definite view, it would be necessary (as Mr. Griffon says) to obtain accurate information as to the sexual and vegetative descent of the boughs in question.

G. Willbrink and P. Ledeboer. **Cross Pollination of the Sugar Cane.** See below, Abstr. 2602. 2463

Carl Snyder. **Life without Oxygen, the Anaerobic Beginning of Life.** — *Science Progress in the Twentieth Century.* No. 21, p. 123. London, July, 1911. 2464

Great Britain

Several convergent lines of evidence lead to the conclusion that the earliest existing organisms were anaerobic. — (1) The simplest forms of life are still anaerobic; (2) the fundamental chemical processes of the cell in all organisms are anaerobic; (3) aerobic life is evolved from anaerobic; (4) increase in need of oxygen is paralleled in the growth of the individual organism; (5) the oxygen of the atmosphere is due to plant action. The relations of anaerobic and aerobic respiration become very simple and clear. In the lowest and most minute of organisms, the proportion of surface to volume is of course at the maximum, and the number of individual living units interacting within the single cell is at the minimum. Some interesting researches of Errera and of Mac Kendrick indicate that the number of these living molecules in the simplest organisms may not be over a score or more and perhaps less. Obviously the chance of an interchange of their products with the surrounding medium, which is the very essence of life, will be far greater in the single-celled organisms than in the multicellular organism with its canals and vessels. In the latter, the chance for accumulation of by-products and therefore the need of a swift and effective neutraliser, like oxygen, will be correspondingly greater.

We seem to have here a simple picture why it is that the oxygen-need should increase with complexity of organisation. The differences shown by organisms, high and low, of about the same grade of organisation would appear to be due to those differences of chemical composition which present-day research, especially the « biological » or precipitin action. have so amply disclosed.

That the oxygen in the present atmosphere has been derived largely, if not exclusively from plant action is probable.

It is well known that the characteristic plant function, the splitting up of carbon dioxide accompanied by the liberation of oxygen, is due to the presence of a complex substance, chlorophyll, whose function apparently is to absorb the lower rays of the spectrum and with this energy to dissociate the molecules of carbon dioxide and water, and these, according to the prevailing theory, give rise to formaldehyde, CH_2O, oxygen being liberated. These « co-

lour bodies » or chloroplasts present one of the most interesting instances of transition from highly organised to living substance. There is no evidence, as yet, that they can live by themselves ; on the other hand they divide and reproduce in exactly the same manner as unicellular animals and plants.

We seem to have here the clearest evidence of symbiosis. Community-life, we know, extends very far down in the scale, even to the green algae and their like. A step lower in the scale and this association with the complicated chlorophyll mechanism is lost. We have then the series of bacteria and moulds which, apparently do not utilise carbon dioxide and often give off hydrogen instead of oxygen.

It is to be noted further that in the metaphyta and most strikingly in the higher plants, the chlorophyll function does not exist obviously in the seed, and does not appear until long after germination has begun. We should infer from this that the chlorophyll « habit » was of relatively late appearance in the plant world, and this conclusion is precisely that to which we are led from consideration of the non-chlorophyllian autotrophic organisms. In other words, there is no reason whatever for supposing that the chlorophyllian plants are anywhere near the bottom of the life scale.

The most reasonable supposition that can be made is that the liberation of oxygen in great quantities by plants began long after a teeming life filled the seas and had at last begun the conquest (*i. e.* occupation) of the soil. There is no reason, however, to suppose that the great bulk of the oxygen of the atmosphere was due to land plants. On the contrary, we have the clearest evidence, from the characteristic « colour zones », that climatic conditions were no essentially different far back in the beginnings of the Cambrian and probably antecedent to the Algonkian. It is possible that the chief producers of atmospheric oxygen were the green algae of the sea and they may be still. Phipson reports that the green algae produce, weight for weight, fifty times the quantity of oxygen liberated from a common phanerogam; *Polygonum*.

To sum up: from every consideration affording a clue to the conditions under which life might have arisen naturally on the earth: from the study of the comparative biology of plant and animal and the protista, as well as the embryological, *developmental*, physiological and bio-chemical processes; finally from such geological evidence as we possess, the one conclusion emerges: that the beginnings of life did not involve the intervention of uncombined oxygen.

The gain from this new point of view may not be great, but it enables us to delimit the problem one step further, so that we may

now say, in the light of our present knowledge : that since anaerobiosis and the fermentative processes are identical, the problem of the genesis of terrestrial life has become that of the natural origin of the organic fermentative substances or enzymes, whose simple grouping into plastids, protomeres, biophores or granules constitutes the primary living units. The aggregation of these latter in turn constitutes the « cell ».

A. Jörgensen. **Micro-organisms and Fermentation.** (Translated by S. H. Davies. Fourth Edition completely revised) Pp. XI + 489, London. C. Griffin and Co. Ltd. 1911. — Abstr. in *Nature*, No. 2175, Vol. 87, pp. 4-5. London, July 6, 1911. **2465**

The first chapter, headed ', Miroscopical and Physiological Examination " deals with such subjects as staining, sterilisation anti septics, nutritive substrata, and pure culture methods.

Chapter II treats of the biological examination of air and of water, chiefly from the point of view of brewery requirements. **Denmark. Great Britain**

In chapter III the functions and conditions of growth of zymogenic bacteria are described.

The moulds form the subject of chapter IV, which also deals incidentally with enzymes and with the influences of various external conditions on micro-organisms in general.

The fifth chapter, occupying nearly 200 pages is concerned with the yeasts, and deals, in addition, with non-sporulating or Torula forms, as well as *Mycoderma vini* and *M. cerevisiae*. A short account is given of the history of fermentation and of the controversy respecting spontaneous generation. Then follow discussions on the biological relationships of yeasts, variations in the saccharomycetes, morphology and anatomy of yeast-cells, spore-formation and its application to the analysis of yeasts, and a number of allied subjects, Lastly come descriptions of the more important culture and wild yeasts met with in the brewing, distilling, and wine-making industries.

The last chapter gives a brief account of the methods and apparatus employed in the preparations and transport of cultures of pure yeast for industrial purposes.

J. Effront. **Putrefactive Fermentation** (Sur la fermentation putride). — *Moniteur scientifique*, 836e Livraison, pp. 489-500. Paris, Août 1911. **2466**

From his studies on the decomposition of albuminoids by digestive diastases and putrefactive organisms, the writer draws the following conclusions : **France**

1. Among the products of the hydrolysis of albuminoids two distinct classes can be recognized : *a*) those composed of peptones and albumoses ; *b*) those composed of primary and secondary amines.

In peptic digestion class *a* predominates ; under the action of trypsins, *b* is in greater quantity. Under the influence of putrefactive organisms, the albuminoid molecule yields, besides the two classes mentioned, a series of products resulting from the de-amidation of tyrosin and primary and secondary amines. In putrefaction, the production of albumoses and peptones from primary and secondary amines is due to a tryptase secreted by the organisms ; the de-amidation of the aromatic bodies and amines is performed by other diastases, the amidases.

2. Amidases transform amino-acids into volatile acids or alcohols with formation of ammonia.

This class of diastases is of wide occurrence in the animal and vegetable kingdoms. Most frequently they are localised in different parts of the organism ; they also occur in moulds and bacteria. These diastases also play a part in germination ; they decompose the reserve nitrogenous bodies, giving off ammonia for the synthesis of fresh compounds.

3. The amidases observed in putrefactive fermentation act as reducing agents. They act by preference on the aromatic substances derived from albuminoids. Neither the liberation of ammonia nor the production of volatile acids belongs specially to the putrefactive organisms ; indeed in them these functions are comparatively little developed.

4. The chemical action involved in the breaking-down of lysin and arginin is probably due to the energy of a special enzyme found only in putrefactive organisms.

All the other enzymes which play a part in putrefaction are found also in non-putrefactive proteolitic organisms.

2467 E. VOISENET. **On a Ferment causing Bitter Taste in Wines.** — See below Abstr. 2874.

2468 W. B. BOTTOMLEY. **The Root-Nodules of *Myrica Gale*, L.** — *The Chemist and Druggist.* Vol. LXXIX, No. 1650, p. 52. London, 9 September 1911.

Great Britain : England

In the Agriculture and Botany Section of the British Association which met this month (September) at Portsmouth, Professor Bottomley read a paper on the root-nodules of *Myrica Gale*, which

in his opinion contain small rod-like organisms identical in appearance and structure with the nitrogen-assimilating bacteria occurring in leguminous nodules. He also reported that the injurious effects of aqueous solutions of well-rotted manure or fertile soil on germinating seeds and on seedlings are due to certain bacteriotoxins, probably toxalbumoses, which are destroyed on heating.

Nodule Forming Bacteria. — See below, Abstr. 2502. 2469

T. Goodey. **The Soil Protozoa.** See below, Abstract No. 2479. 2470

Meteorological Reports and Year-Books. — *Nature*, Vol. 87, N. 2184, P. 338, London, September 7, 1911. 2471

Vienna. — Central Meteorological Office (1908). The forty-fifth year-book (new series) of this important service appears in the same form as heretofore; it includes daily observations and monthly and yearly results in the international form for a number of stations, hourly observations for Vienna, and temperature and rainfall observations at other stations. **Austria. Germany. Great Britain. Norway. Canada**

London. — Meteorological Office (1910). — Summaries of the results have been published of the geophysical and meteorological observations in continuation of the reports of the observatory department of the National Physical Laboratory.

Liverpool Observatory (1910). — The report of this valuable institution, maintained in great efficiency by the Mersey Docks and Harbour Board, appears in the same form as in previous years. An interesting experiment was made in the autumn, in connection with the determination of time, by observing the signals sent out by radio-telegraphy from the Eiffel Tower and from the German station at Merddeich; the signals were received at Waterloo station with great clearness.

Norwegian Meteorologicat Institnte (1910). — These valuable observations are published in two volumes, as in previous years: the year-book containing daily observations with monthly and yearly summaries according to the international scheme, and hourly readings for Christiania: daily amounts of rain and snow with summaries, and normal percentages for as many years as are available.

Toronto Observatory, Canada (1909). — The results of this valuable series of meteorological observations are given for each month and the year, together with the average for the past seventy years.

Bremen Observatory (1910). — The observations are published in the same form as in previous years as one of the valuable series of German meteorological year-books; it contains, in addition, results for the lustrum 1906-10, and for the thirty-five years 1876-1910, with hourly means for twenty years.

2472 **The Weather in the United Kingdom during the First Six Months of 1911.** — *Nature.* No. 2175, Vol. 87, pp. 19-20. London, July 6, 1911.

United Kingdom

The summary of the weather for the first six months of the present year, which has just been issued by the Meteorological Office, shows that the mean temperature was slightly in excess of the average in all parts of the United Kindom, taking the period as a whole. The absolute highest temperature in any district during the six months was 84°F. (28.88° C.) in the north-east of England, and 80°F. (26·66°C.) has been exceeded in every district except in the north of Ireland and in the Channel Islands, whilst the lowest temperatures were below 20°F. (— 6.66° C.) in every district except in the Channel Islands, the absolutely lowest reading being 11°F. (—11.66° C.) in the east of Scotland. The largest aggregate rainfall for the six months January to June inclusive is 24.02 in, (610.05 mm.) in the north of Scotland, which is 0.58 in (610.08 mm.) more than the average; but this is the only district with an excess of rain except the east of England, where the aggregate was 10.33 in. (262,37 mm.) and the excess 0.15 in. (3,8 mm). The smallest aggregate rainfall in any district is 8.81 in. (211.06 mm.) in the Midland counties, where the deficiency for the six months amounts to 3.30 in. (83.81 mm.) The greatest deficiency is in Ireland, amounting to 3.97 inches (109,8 mm.) in the north and 3.88 in. (98.54 mm.) in the south, In the south-east of England. which includes the London area, the aggregate rainfall was 9.97 in. (253,22 mm.), which is 1.38 in. (35.05 mm.) less than the average. The greatest number of rainy days was 106 in the north of Scotland, and the least 73, in the Midland counties. The total duration of sunshine was nowhere very different from the average; there was an excess in all districts except in the north-east of England, the Midland counties, and the Channel Islands, bnt the deficiency nowhere exceeded 20 hours.

The rainfall for the first month of summer was generally in excess of the average; but the difference from the normal was nowhere very great, except in the north east of England, where the

excess amount to 2.20 in. (55.87 mm.) The duration of bright sunshine for June was generally in excess of the normal. At Greenwich the mean temperature for June was 60.8 F (16° C.) which is 0.5° F (0°.27 C.) above the average of the previous sixty years; the first half of the month was much warmer than the latter half, and the rain during the latter half was very much heavier; the aggregate for the month was 0.1 in. (2.53 mm.) more than the normal; whilst the duration of bright sunshine was about twenty-five hours more than usual.

R. A. Marriot T. **Why we may expect Warmer Winters,** pp. 17 March, 1911. **2473**

In this pamphlet the writer explains Drayson's theory of the periodic changes of the obliquity of the earth's axis. According to Drayson's calculations the maximum obliquity occurred about 15 450 years ago, while the minimum will be 385 years hence. The condition of maximum obliquity would mean very hot summers and very cold winters over the " temperate " regions of both the northern and southern hemispheres, that is to say, the conditions most favourable for a glacial period. **Great Britain. Canada**

According to this theory the glacial period passed away at only about 6000 B. C., a date which seems to agree much better with geological observations than the 80 000 years required by Croll's theory. Further, it is not too remote to furnish the traditions of floods so universal among mankind.

Again, the writer shows that calculations of the obliquity made from Drayson's formula agree very closely with the obliquity observed in the last few years.

" A knowledge that a change is taking place in the direction of milder winters is of such great importance that it is well worth while to definitely establish the fact. To the vast areas now being opened up in Canada the matter is of the highest importance ".

The Climate of Eastern Uruguay, or Upper Paraná. (Caracteres climatéricos de la región Este ó Alto Paraná). — *Revista de Agronomia y Boletin de la Extación agronomica de Puerto Bertoni.* Tomo IV. No. 8, pp. 31-32. Asunción. Agosto y Septembre de 1910. **2474**

The climate of Upper Paraná is very different from that of the rest of Uruguay and Argentina owing to its great moisture. The abundant rains and fertile soil allow of crops being raised which cannot be grown in other parts of the State. **Uruguay: Upper Parana**

The average annual rainfall is 2039 mm. (1) (average for 25 years according to observations made by Dr. M. S. Bertoni), as compared to 1413 mm. in western Uruguay; the general average for the whole country is 1726 mm. The rains are distributed equably throughout the year, though they are more frequent in the months of October, January, and May. There are either no periods of drought, or they are brief and as a rule do no harm; when they occur, it is chiefly in the months of December, March and August. Torrential rains are infrequent; they last at most a few hours distributed over a short series of days.

Dews are unusually heavy, attaining a maximum of 240 mm. The average is about 200 mm. In the western section of the Republic the average is about 100 mm. which is a remarkably high figure. Dewless nights are very unusual, as night winds are almost unknown.

The atmospheric moisture is 92 %, or one of the highest in the world. This moisture combined with a constant and temperate heat, accounts for the extraordinarily luxuriant vegetation.

The average annual temperature is 21.1° C. (69.98 Fahr.) with only slight variations in summer and winter. Even during the summer, the nights are cool. In many sheltered spots along the river the temperature never falls below 0°C. in winter. South winds or northerly monsoons, the winds of the country, are extremely rare; their average annual velocity is 0,8 metres (2.6 ft.) per second; their maximum velocity 5 metres (16.4 ft.) per second. Frosts are rare and of short duration, therefore vegetables can be grown in the open all through the winter.

2475 EDWARD F. RUSSELL. **The Soil and the Plant**. (A Review of Some Recent American Hypotheses). — *Science Progress*, No. 21, pp. 135-152. London, July, 1911.

Great Britain: England

Of the various hypotheses as to the constitution of the soil that have been framed during the course of recent investigations, the most complete are those of Whitney, Cameron and others associated with the Bureau of Soils of the United States Department of Agriculture. The foundation of these hypotheses is the recognition of the vitally important functions of the soil moisture.

The films of water surrounding the particles are looked upon as the nutrient solution feeding the plant and constituting by far

(1) 1 mm. = 0.03937 in.

the most important part of the soil. The hypotheses may be summarised under the following headings:

1) The soil is formed by disintegration of the rock-forming minerals, decomposition taking place to a relatively insignificant extent.

2) All normal soils are therefore chemically alike, and the soil solution has the same composition in all soils.

3) The soil solution forms the nutrient solution for plants; all soils are therefore equally well provided with plant food.

4) This nutrient solntion is distributed over the surface of the soil particles in accordance with the laws governing surface attractions. The rate at which any disturbances are readjusted depends on certain properties of the particles and is of the first importance in determing the productiveness of soils.

5) But in many cases there must be some other factor involved, because the aqueous extracts of soils, instead of behaving all alike, as they should according to 2), often show the same differences in productiveness as the soils themselves. A toxin must therefore be present in fertile soils.

6) Some toxins may arise normally during the decomposition of the soil organic matter, but some are probably excreted by plants.

7) Fertilisers do not function primarily in the soil as nutrients for the plants, but they have a much more complex action. They may alter the distribution of the soil solution, or throw out of action some of the toxins, and probably they serve other functions also.

Discussion was first centred on the relative importance of the physical and chemical properties of soils, and more recently on the alleged excretion of toxins by plants.

It was shown that the size of the particles and the extent of their surfaces were highly important factors in regulating the water and air relationships of soils; further, that the known agricultural properties of the soil could be correlated with the amounts of the variously sized particles it contained, amounts readily determined by a mechanical analysis.

The special properties of the finer portions of a soil below 0.005 mm. are associated by Whitney with their small dimensions and not with any particular chemical compositions; but evidence is accumulating that mere smallness in size will not account for all the observed properties.

The view most commonly held by chemists is due to van Bemmelen, according to which the concentration of the soil solution

directly depends on the composition of the colloidal complex of the soil, and may be altered within limits by addition of soluble salts

Mr. Whitney tacitly assumes that the concentration of the soil solution is uniform throughout the mass of soil. The writer's view is that the concentration is subject to considerable local fluctuations, depending on the local partial pressure of carbon dioxide in the soil atmosphere, which in turn depends on the distribution of roots and other living agencies, on the distribution of calcium carbonate, of water and other factors. The difficulty of extracting the soil solution has not been satisfactorily overcome, and recourse must be had to devices which give its composition only approximately.

Even if a quantity of soil solution could be extracted, the writer cannot agree that the average composition it possessed would have any real counterpart in the soil.

Dr. Russell discusses Mr. Whitney's statement that variations in concentration of the culture solution do not in any case influence the rate of plant growth, and consequently any variations in the strength of the soil solution would be without effect on fertility. The fact that plant nutrients such as nitrates, phosphates, and potassium salts are among the commonest and most effective manures, whilst non-nutrient salts are not in use for this purpose, is strong ground for allowing nutritive functions to fertilisers; nor, since their complex action is admitted, do we see, says Dr. Russell, what is gained by denying them such functions.

Among the numerous organic compounds of the soil that Schreiner and his co-workers are isolating, it is not surprising that some possess toxic properties. But it does not follow that a substance toxic in water culture is toxic in the soil.

There is, however, indirect evidence of the presence of toxic substances in the soil under certain conditions.

There is reason to suppose that the micro-organic flora of the soil is altered when the calcium carbonate falls below a certain limit; and we can take it as certain that the course of decomposition in such soils differs from that going on in presence of sufficient calcium carbonate.

The Bureau of Soils does not generally state whether or not the soils under investigation are rich in calcium carbonate, but from their general description it appears that the soils giving the toxic extracts are in the " sour " category, especially as calcium carbonate or lime commonly improve the soil and the extract. So far as " sour " soils are concerned, therefore, it can be admitted with Whitney that toxic organic substances may be a cause of infertility. But there is no evidence, that such substances are present in soils

sufficiently provided with calcium carbonate, in which class are included all well farmed soils.

Turning to the question of plant excretions, no evidence whatever, says Dr. Russell, can be found in favour of their existence. At Rothamsted plants have been grown continuously in water cultures and in soils, without showing any sign of suffering from excretions of previous generations.

It is asserted by the American workers that the continued growth of one and the same crop on the same soil leads to a low crop production, whilst at Rothamsted on this side it has not been possible to obtain any evidence to this effect.

Whitney argues from his hypotheses that rotation takes the place of fertilisers, and the figures obtained at Rothamsted on the Agdell Hoos and Broadbalk fields in rotation, at first sight lend some colour to his view. But the statistics for the turnip crop put a wholly different complexion on the matter.

On the Agdell unmanured plot turnips give a miserably poor crop of less than a ton to the acre, against twelve tons or more on the manured plot: here then there is no evidence of rotation acting like a fertiliser. While therefore we cannot accept Whitney's hypothesis (says Dr Russell) we are not yet prepared with another; the whole matter remains among the many as yet unsolved problems presented by Agdell Field. There is no doubt, continues the writer, that the work of the Soil Bureau has suffered from leaving out of consideration all biological changes going on in the soil. The decomposition by micro-organisms of the residues of previous generations of plants gives rise beyond doubt to quantities of plant-food, yet the function of this nutrient material is never considered.

Thus the field of view is unduly restricted. The investigations have, however, served a very useful purpose in stimulating inquiry, and they have brought home the fact that the relationship between soils and plants is complex, Whether further work will support their hypotheses or not, Messrs. Whitney, Cameron, Schreiner and their colleagues have made agricultural chemists re-examine their ideas on the soil, and such a reconsideration must in the end advance the subject, however troublesome or superfluous it may at the time appear. A bibliography of 30 publications is given as an appendix.

Relation of Acidity of Soil to Grass Crops. — See below Abstr, 2502. 2476

2477 F. J. Alway, E. K. Files, and R. M. Pinkney. **The Determination of Humus**, — *Bulletin of the Agricultural Experiment Station of Nebraska*, N. 115, Vol. XII, Art. V., p. 25 + tab. IX. Lincoln, Nebraska, U. S. A., June 1910.

United States: Nebraska

The writers have compared the Hilgard, Huston-Mc Bride, Cameron-Breazeale, and Mooers-Hampton methods for the determination of humus, using arid, semiarid, and humid soils (1).

The results show:

1. The Hilgard method, a modification of the Grandeau method, gives entirely reliable and satisfactory results.

2. The Huston-Mac Bride, adopted by the Association of the U. S. Official Agricultural Chemists gives results which are entirely unreliable and which, in the case of most soils, are far too high. The errors incidental to the method are of such a nature that it seems impossible to apply to the results any satisfactory correction formula.

3. The humus extract obtained by the Huston-Mac Bride method after being passed through a properly prepared porcelain filter, gives results which are concordant with those obtained by the Hilgard method.

4. The Cameron-Breazeale method, forcing the solution through the Chamberland-Pasteur filter by means of compressed air, gives satisfactory results, but it is much more tedious than either the Hilgard or the Mooers-Hampton method.

5. The Mooers-Hampton modification of the Huston-Mac Bride methods gives results entirely concordant with those of the Hilgard method. For some soils it is preferable to the latter, requiring much less time.

6. Ammonia solutions of different strengths were not found to have the same solvent power for humus. The differences for strengths between 2 and 4 per cent were slight, but where solutions of from 16 to 28 per cent were used, considerably more humus was dissolved.

7. The amount of so-called « humus ash » found in the case of a soil sample varies from method to method and bears no relation to the strength of the ammonia used. There is little or no agreement between duplicate determinations, of the « humus

(1) Cf. E. W. Hilgard. *Soils*, Chap. VIII, New York, 1907 See also *U. S. Dept. of Agr. Bur. of Chem.* Bull. 38 (1893), Bull. 69 (1902), Bull. 107 (Revised 1908). (*Ed*).

ash ». It is probable that the greater portion of the « humus ash » obtained by any of the methods is not an essential part of the humus.

8. In reporting the humus, the percentage of « humus ash » should always be stated, as it serves as an indication of the reliability of the humus determination.

A. Dachnowski. **The Bacterial Flora as a Factor in the Unproductiveness of Soils.** Ohio Nat., 10 (1910), No, 6 pp. 137-145, figs. 2. Abstr. in *Exp. St. Record:* Vol. XXIV, N. 6; pp. 529-530; Washington, May 1911. 2478

United States: Ohio

In a contribution from the botanical laboratory of the Ohio State University the author gives the results of experiments on the toxin-producing power of pure cultures of bacteria isolated from the bog water from the uppermost layer (1 ft. deep) of soil from Cranberry Island at Buckeye Lake, Ohio.

The physiological tests were made in half-litre Mason jars containing 500 cc. of inoculated solutions, obtained by inoculating sterilized solutions of bog water and peat with pure cultures of the isolated bog bacteria, and with a mixture of bacteria found in 1 cc. of fresh bog water. Check experiments were also carried on with sterilized uninoculated solutions and with normal untreated bog water. All flasks were incubated from 2 to 6 weeks prior to the physiological tests, and then in these solutions wheat seedlings from 4 to 5 cm. high were grown for 15 days under greenhouse conditions of uniform temperature and light. The growth of the wheat seedlings in the various cultures, and the water loss was reported every fifth day. It is claimed that when the bacteria are omitted from the sterilized solutions no evidence of toxicity is noticeable in the wheat seedlings, but that when grown in the inoculated culture media there is an active stimnlation or depression of the normal functions of the plants.

Experiments are also reported on the ability of micro-organisms to convert soluble proteids into amido-acids and allied products from the decomposition of proteids, in which sterilized solutions of bog water and peat were used as culture media to which sufficient peptone was added to produce a 1 per cent peptone culture. The culture was tested physiologically after a 2-weeks incubation by growing wheat seedlings in it for 5 days, at the end of which time transpiration, growth, and the green and dry weight of the plants were found to be proportionately reduced.

It is claimed that the retardation in growth of the wheat plants is not caused by physical or chemical conditions, but through the direct activity of the bacterial flora, and that reciprocal relations may exist between groups of soil bacteria and the plants grown upon the soil. The injury to cultivated crops by weeds or previous crops may be due to influences on the bacterial life of the soil unfavourable to succeeding agricultural crops.

2479 T. Goodey. **A Contribution to Our Knowledge of the Protozoa of the Soil.** — *Nature*, No. 2172, Vol. 86, p. 540. London June 15, 1911.

The paper (published in the *Proceedings of the Royal Society*, London, June 1911) is an account of work carried out on the soil protozoa, which are considered to be chiefly instrumental in limiting the activity of bacteria in a comparatively infertile soil. Methods of obtaining protozoa in cultures of soil are described, and a list of the different species found so far is given. An experimental method for quickly finding the earliest ciliated protozoa occurring in a soil culture is described, in which use is made of the galvanotactic response which many of the protozoa show when stimulated by means of a continuous electric current. By means of this method, active ciliated protozoa have been found in from 1 ½ hours to 4 hours. Experiments on the length of time required for a ciliated protozoon, *Colpoda cucullus*, to develop from its resting cysts have also been conducted in similar media and at the same temperature as used in the soil cultures. It has been found that the times required for development in both soil and cyst cultures are comparable, and that the first *C. cucullus* to occur in soil cultures are almost identical in appearance with those which emerge from resting cysts. The conclusion drawn from the experiment is that the ciliated protozoa are only present in the soil in the encysted condition, and do not, therefore, function as the factor limiting bacterial activity in the soil.

Great Britain: England

2480 Hilderic Friend. **A New Earthworm** (1): ***Dendrobaena merciensis.* The Distribution of British Anellids.** — Abs. *Nature*, No. 2170, Vol. 86. London, June 1, 1911.

The May number of *The Zoologist* contains an account of a new earthworm or treeworm recently discovered by the Rev. Hilderic

Great Britain

(1) See page 214 *Bull.* December 1911. (*Ed.*).

Friend. It is named *Dendrobaena merciensis*, Friend, because it was found near the old capital of Mercia. At first sight it resembles *D. Beddardi* and *Bimastus Eiseni*, but it differs from these in the fact that the girdle extends from the twenty-second to the thirty-first segment. It is destitute of the *tubercula pubertatis*.

In the same journal, we have a continuation of the writer's studies in the distribution of British anellids (1), in which the county records are set forth alphabetically. There are no records given for Bedford, Berkshire, or Cheshire, but we find Bucks credited with 11 species of earthworm, Cambridge 16, the Channel Islands and Cornwall 12, Cumberland 17 and Derbyshire 16. The total number of known British species has now been raised by Mr. Friend to 40.

HILDERIC FRIEND. **The Ooze of the Thames** (2). — *Nature*, Vol. 87, No. 2186, p. 381. London, 21 September. 1911. 2481

Some time ago the writer directed attention to the part played by annelids in making the ooze of rivers, such as the Nile, fertile. Aided by a Government grant, research has been continued during the year, and in August a special visit was paid to Kew Gardens and the Thames. The river was very low, and specimens were therefore obtained which are not always available. On careful examination of the ooze it was found that the mud was teeming with *Helodrilus oculatus*, Hoffm., a new record for the south of England; *Paranais naidina*, Bretscher, new to Britain; *Monopylephorus elegans* Friend, new to science; and other organisms. There were many living nematodes, half an inch or more in length, all apparently belonging to one species. The history of this parasite has not yet been worked out, nor its host discovered, but its white thread-like integuments were present in vast numbers in the ooze. In the case of annelids, the process of decay is so rapid that dead worms are rarely found, and only by means of the most careful microscopic examination or chemical analysis can one discover how numerous they have been. But the evidence goes to show that the ooze of rivers

Great Britain

(1) See on this subject: *The Science and Practice of Farming during 1910 in Great Britain*, p. 160. Rome, International Institute of Agriculture, 1910. (*Ed.*).

(2) Cf. *The Science and Practice of Farming during 1910 in Great Britain*, p. 161. Rome: International Institute of Agriculture, 1910.

is immensely enriched in nitrogenous matter year by year through the death of annelids, as well as oxygenated by their tireless movements.

While much has been done in the analysis of soils, little, if anything seems to have been undertaken in relation to ooze. The writer's researches are at present largely restricted to the systematic study of the living species of annelids; but it would be of immense advantage to science, and especially to agriculture, if some expert like Dr. Russell could give us careful analyses of river oozes.

The importance of the subject is such that it merits further investigation,

2482 **The Influences of Molasses on Soil Fertility.** (1) — *The Agricultural News*. Vol. X, No. 238, p. 179. Barbados, June 10, 1911.

The following facts are taken from the Annual Report, for 1908, of the *Station Agronomique* Mauritius.

The amount of potash contained in molasses and scums, — such mixture being already a good manure in itself — makes its application in greater quantities than 1 litre (about 1 3/4 pints) to each sugar-cane plant undesirable. Where molasses is used with mixed manure, its relatively high potash content should be allowed for in making the mixture.

Mauritius

Molasses and scums used together as a manure provides an excellent means of stimulating the growth of backward plants.

The report goes on to state that the use of molasses results in an increased growth of the crop, which cannot be explained from considerations alone of the plant food which is added to the soil in the molasses. The experiments described show that the influence of the molasses is not exhausted during the first crop, but continues to exhibit itself for some time. This influence is seen best in the case of plant canes, and is well shown with ratoons. Where molasses and other manures were used together, the action of the former was found to be strongest in plots which had not received potash, and in those to which no nitrogen had been given; these results are to be expected from the fact of the comparatively high potash content of the molasses and its influence in stimulating the fixation of nitrogen.

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(1) Cf. this *Bulletin*, for Dec. 1910, p. 230. (*Ed.*).

In Mauritius, the molasses is generally applied in the cane holes before planting; but when it is not found possible to do this, it is placed between the rows, either after planting or when the cane has attained a certain amount of growth. The adoption of this scheme is possible, because molasses has not been found to possess any caustic action such as was formerly attributed to it; nor does it damage the plants in any way, provided that it is used carefully and in reasonable quantities.

The suggestion is made that, on account of the action of molasses in stimulating the nitrogen-fixing organisms in the soil, there would be some advantage in using it after dilution and in small doses at frequent intervals (1).

Experiments are being carried out in Antigua for the purpose of investigating the influence of molasses on soil fertility. The results obtained during the second season (1909-10) will appear in Pamphlet No. 68 of the Department of Agriculture for the West Indies entitled *Manurial Experiments with Sugar-cane in the Leeward Islands*, 1909-10.

The experiments continue to show, as a mean of the two seasons' results, that there is some increase in weight of cane on the plots receiving the molassess.

In the second season, however, the effects of the application are not so well marked as in the first: the employment of 200 gallons of molasses to the acre did not increase the yield, while that of 400 gallons gave an additional 1.2 tons of cane per acre. One experiment showed the existence of residual action of the molasses.

A Bulletin entitled *Some Biochemical Investigations on Hawaiian Soils*, issued recently from the Experiment Station of the Hawaiian Sugar Planters' Association, states that molasses applied at intervals to growing canes which have received artificial manure is likely to do harm, either by destroying nitrates that have been already applied, or by preventing nitrates from being formed from other compounds containing nitrogen, in the manure. Further, it is considered that the application of molasses to fallow land, or to land

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(1) For experiments in fertilising with sugar (organic inoculation of the soil), in cultures of grain leguminosae and of lucerne, at San Rossore, near Pisa (Italy) in 1905 see:

ITALO GIGLIOLI, *Nuovi concetti e nuove esperienze nella Concimazione e nella Inoculazione dei terreni. Inoculazione organica del terreno. Bollett. della Soc. degli Agricoltori italiani*, Anno III, No. 22. Roma, 30 Nov. 1908.

(*Ed.*).

in which sugar-cane is to be planted after several weeks have elapsed, may have a beneficial effect in stimulating the action of the nitrogen-fixing organisms, and thus adding to the store of nitrogen for the future crop.

2483 **Hedges and Economy of Moisture.** — *Mark Lane Express Agricultural Journal,*, Vol. 101, No. 4166, p. 175. London, July 31st, 1911.

This dry summer and the parched appearance of the grass lands makes one reflect on the important *rôle* that moisture plays in agriculture.

Germany It was estimated that the 1904 drought in Germany inflicted a loss of something like a hundred million pounds on German agriculture. This seems enormous, but it is the calculation of Dr Backhaus, of Berlin, a recognised authority on scientific questions connected with agriculture, and it is partly explained when we consider that the beet root crop, which is the most valuable, was only about half an average one.

The growth on a soil, or its covering, exercises great influence on the retention of moisture. According to experiments made by Wollery, the moisture at the depth of a yard under grass is about 14 per cent.; under fallow 23 per cent.

Crops require for their best development varying quantities of moisture; for instance, according to the demonstrations of Adolf Meyer, barley makes the best growth when the top soil is saturated with about 60 per cent of moisture, and oats develop with most advantage when 90 per cent of moisture is present.

It has also been ascertained that unmanured fields require nearly twice as much moisture as soils which have received the advantage of dressings of farmyard manure or artificials (1).

In France it is quite common to find around the vegetable and fruit gardens, railings and thick hedges arranged as wind

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(1) Cfr. J. B. LAWES and J. H. GILBERT, *Effects of the Dronght of 1870 on some of the Experimental Crops at Rothamsted.* Journ. Roy. Agric. Soc. England, Vol. 32. (1871); and *Rothamsted Memoirs,* Vol. III. No. 11.

At Rothamsted during the great drought in 1870. there was a great difference in the proportion of moisture in fallows, and in land under cultivation and meadows.

(*Ed.*).

protectors; the chief purpose of which is to prevent the wind sweeping across the surface of the soil and drying it up. In England it has been noticed that coincident with the removal of hedges and trees from the boundaries of the fruit gardens and fields, the crops seem to have lost some of their former luxuriance, which is attributed to the lessened moisture in the soil.

S. S. Peck, **Lysimeter Experiments in Hawaii**. Report of Work of the Hawaiian Sugar Planters' Association. *Bulletin* No. 37, p. 5. Honolulu, Hawaii, 1911. **2484**

The experiments reported by Mr. Peck have for their object principally the study of 1) the effect of various forms of lime on the formation of nitric nitrogen in an acid, *mauka* (upland) soil from a wet district of these islands; and (2) the effect of various fertilizer salts alone, and in combination, on the formation of nitric nitrogen in an alkaline *makai* (lowland) soil from a district of limited rainfall. The results are not intended to be interpreted as giving any definite conclusions as to the effects of the various treatments on cane crop production. While from numerous experiments, it has been fairly well established that the nitrogen more than the potassium or phosphorus is the "dominant" fertilizing constituent for cane crops, it is true, only in a measure, that conditions which make for increased production of nitric nitrogen will necessarily be accompanied by increased crop returns. It is possible in given cases that the best treatment of a soil with this object in view may result in unfavorable conditions for plant development, or exert an ultimate harmful influence on its fertility. For this reason, while the tests are classified according to the nitric nitrogen produced by the respective treatments, it must be understood that they do not represent, and cannot supplant actual trials in the field, with the weight of several crops, and the condition of the soil after the crops as the deciding factors. **Hawaii**

Soils Used. — The upland soil was taken to a depth of twelve inches from land not long under cultivation, at an elevation of 1700 feet on Hawaii on the windward side of the island. It is high in organic matter, with a reaction acid to litmus, and of a loose, friable texture. The lowland soil came from Kauai, and was light red in colour and alkaline to litmus. This latter soil has been under cultivation for some time, and had apparently received within a few seasons a liberal application of lime. It was of a porous texture, easily permeable to water.

The lysimeters were constructed of galvanized iron, painted inside with asphalt paint. Each lysimeter was two feet in height and eight inches in diameter. The bottom was perforated with small openings, and led into a funnel which was soldered to the bottom. The ring of the funnel formed a support on which the vessel rested. The bottom was covered with coarse sacking, on the top of which three inches of washed black lava sand were placed. In the upland series, twenty-five pounds of soil were sufficient to fill each lysimeter to within three inches of the top; the lowland soils, being of a higher specific gravity, weighed forty pounds to each container. Distilled water was used for draining purposes, an irrigation being performed at two weeks' intervals. A definite amount of water was used each time, the leachings being received in Winchester bottles and measured. These were analyzed for nitric, nitrous, and ammonia nitrogen, total mineral matter, lime, potash, and phosphoric acid, the total amount of each being recorded for each leaching.

SERIES A. — *Upland Soil.*

The two series consisted of twenty-four lysimeters, twelve being given to the upland, and twelve to the lowland soil. The twenty-five pounds of the upland soil as placed in the lysimeter measured 955 cubic inches. From this it follows that an acre foot of such a soil would weigh 1 970 000, or in round numbers 2 000 000 pounds. On this basis the lysimeters were treated as follows:

1) Nothing; 2) Air-slaked lime; 3) Calcium carbonate; 4) Calcium sulphate; 5) Ammonium sulphate; 6) Ammonium sulphate and slaked lime; 7) Ammonium sulphate and calcium carbonate; 8) Ammonium sulphate and calcium sulphate; 9) Complete fertilizer; 10) Complete fertilizer and slaked lime; 11) Complete fertilizer and calcium carbonate; 12) Complete fertilizer and calcium sulphate.

The addition of calcium in all forms made for an increase in nitric nitrogen, both from the organic nitrogen of the soil and from nitrogen added as sulphate of ammonia. There was no decided difference between the effect of caustic lime and carbonate of calcium, while the sulphate produced a greater amount of nitric nitrogen than the other lime treatments. This result is quite at variance with those reported in a previous series of lysimeter experiments, where the effect of the sulphate of calcium was to depress nitrification. The difference in results is to be attributed entirely to the difference in the type of soils treated.

Potassium in drainage. — All the calcic compounds manifest a solvent action on the potassium of the soil, the sulphate exerting the greatest effect. This brings us to the consideration of the cause of increased crop returns following a gypsum fertilization,

since such a beneficial action is ascribed generally to the fact that the calcium in this form replaces potassium in its insoluble combinations in the soil, making the latter available to the crop. The nitric nitrogen and soluble potash generally increased together. More nitric nitrogen meant more soluble calcium, and it may be due to this reaction that more soluble potassium resulted. It follows that the presence of soluble potassium was due to the degree or extent of nitrification, influenced by the amount of soluble calcium, and not that nitrification was dependent on the quantity of soluble potash. Reasoning from this, we must conclude that the effect of calcium sulphate in increasing nitrification is not caused by the potassium liberated by the calcium sulphate, but rather from the soluble calcium itself. In this connection it is interesting to refer to the results obtained in 1906. The soil treated in this case was one of good lime content, the aspartic acid method giving a percentage of 0.327. The effect of ground coral was to increase nitrification slightly, but both burned lime and gypsum depressed it, the latter to a considerable extent. At the same time, the potash made soluble by the gypsum was increased over two-fold. The writer, in summing up the results, showed the close relationship existing between this result and the depressive effect of potash fertilization on cane crops. The soil in the experiments here reported, showed only 0.035 per cent of lime soluble in a one per cent aspartic acid solution, and responded as regards nitrification very plainly and promptly to liming, especially with gypsum.

The results as regards the higher solubility of the potassium in soil treated with calcium compounds are not characteristic of all soils. Morse and Curry, working with soils in New Hampshire, found that with soils in Western Oregon, gypsum liberated potash, but lime did not. In the soil of these experiments, all three forms showed their effects in increased amounts of potash in the drainage waters, the gypsum to the greatest degree, and the caustic and carbonate forms to about the same extent.

Considerable work has been done by O. Loew to show the importance of a correct ratio between lime and magnesia in soils. This theory has not won entire acceptance by agricultural investigators, but has been the subject of extensive research by Japanese scientists. Takeuchi, in experiments with oats and spinach cultivated in soil to which magnesia was added, found that the sulphate of lime corrected the effect of the excess of magnesia, but the carbonate actually depressed the yield to an unusual extent.

SERIES B. — Each of the lysimeters in this series was supplied with forty pounds of the lowland soil, which measured 1 000 cubic

inches. An acre-foot would therefore weigh 3 010 867 pounds, or in round numbers 3 000 000 pounds, Fertilizing material was added at a rate corresponding to 100 pounds of nitrogen, phosphoric acid and potash, per acre, respectively The nitrogen was supplied as ammonium sulphate; phosphoric acid as double superphosphate; and potash as sulphate, with the exception of tests 15, 23, and 24. The treatment of the several lysimeters was as follows:

13) Nothing; 14) Phosphoric acid; 15) Phosphoric acid from tri-calcic phosphate; 16) Potash; 17) Nitrogen; 18) Phosphoric acid and potash; 19) Nitrogen and phosphoric acid; 20) Nitrogen and potash; 21) Nitrogen, phosphoric acid, and potash; 22) Nitrogen and calcium oxide; 23) Nitrogen as nitrate of soda; 24) Nitrogen as nitrate of lime.

General conclusion. — The results of the tests of series B, while showing the effects of the respective treatments on the production of nitric nitrogen, do not absolutely indicate the treatment that should be applied to a land of similar composition under cane. The results recorded here report the effects on the transformation of the soil nitrogen, under crop conditions; other considerations, such as the supplying of mineral nutriment for the growing crop, the influence on the texture and water-holding capacity of the soil on which a crop is growing, the effect of the fertilizers on insect and parasitic life, etc., present new complications, which can be solved only by field tests *in situ*. However, of the nutrients necessary for cane-crop growth, nitrogen is the most essential for gains in yield; and any method of treatment, such as in test 22, from which indubitably harmful conditions for nitrification accrued, may be very safely accepted as one to be avoided. The best results, as regards quantity of nitric nitrogen produced, were obtained in test 17, where only sulphate of ammonia was applied. Yet this method of treatment is not advised in actual practice, since it would work towards the depletion of the soil, both through drainage waters and crop, of the other important elements, such as potassium and phosphoric acid. These elements should continue to form a part of the usual applications to the soil, in order to preserve its fertility. It is a matter of regret that the soil used in this second series had been treated with lime a short time previous to being sent to Mr. Peck, and therefore did not represent a more nearly typical normal soil. However, since the practice of liming is very general, the results as obtained are both interesting and instructive, showing the transformation of nitrogen into nitric nitrogen in a soil to which lime had been applied, probably, as in this case, to an excessive extent.

SUMMARY, — (A) Working on an upland soil rich in organic matter; poor in soluble lime and potash, and acid to litmus:

1) Calcium additions as oxide, carbonate or sulphate, increase the nitrification of the soil nitrogen or nitrogen added as sulphate of ammonia.

2) Calcium additions as oxide, carbonate or sulphate, increase the amounts of lime and potash soluble in water and recovered in the drainage.

3) Calcium sulphate was more effective in all three respects than calcium oxide or carbonate.

4) The acidity of the soil did not seem the controlling factor as regards nitrification; the water-soluble calcium seemed of great significance.

5) Fertilizing with water-soluble phosphoric acid and sulphate of potassium produced a slight increase in the nitrification of ammonium sulphate.

6) Any increase in nitrification was generally accompanied by an increase in lime in the drainage.

(B) Working on a lowland soil, containing a moderate amount of organic matter, rich in soluble calcium, and alkaline to litmus:

1) Additions of fertilizing materials, as double superphosphate, tri-calcic phosphate and sulphate of potassium, increased the amount of nitric nitrogen formed from the soil nitrogen.

2) The best results in this respect followed the use of double superphosphate or tricalcic phosphate.

3) A decrease in nitrification resulted from the use of potash and phosphoric fertilizers in lysimeters to which nitrogen as ammonium sulphate was added.

4) The greatest depressions in this respect followed the addition of double superphosphate.

5) Liming with caustic lime depressed greatly the amount of nitric nitrogen obtained from sulphate of ammonia.

6) No difference was observed between the nitric nitrogen in the drainage obtained from equal applications of nitrogen as sodium nitrate and calcium nitrate.

7) Both nitrate fertilizations yielded less nitric nitrogen in the drainage than was obtained from an equal amount of nitrogen as ammonium sulphate.

8) Less lime was found in the drainage from the nitrate applications than from the ammonium sulphate application.

9) There was no relationship between the lime in drainage and extent of nitrification.

2485 Dr. W. THAER. **Influence of Lime and Humus on the Mechanical, Physical and Chemical Properties of Clayey, Loamy, and Sandy Soils.** (Der Einfluss von Kalk und Humus auf die mechanische und physikalische Beschaffenheit von Ton- Lehm- und Sandboden. II. Der Einfluss von Kalk und Humus auf Basenabsorption und Lösung von Bodenbestandteilen. Arbeiten aus dem landwirtschaftlichen Versuchsfelde der Universität Göttingen). — *Journal für Landwirtschaft* Bd. LIX, Heft I. und II pp. 9-57, und II 107-135, Berlin, 1911.

The work under review describes in detail investigations made on 6 samples of soil as follows :

Germany

1. Clay ; yellowish brown, very hard and dry, for several years unmanured, containing apparently but little humus.

2. Under ground loam ; red, poor in humus, with much finely divided lime.

3. Loam ; rich in humus, black ; very valuable.

4. Sand ; rich in humus ; grey.

5. Manure mixed with some sand.

6. Sand ; yellowish and with no humus.

In determining the effects of lime, besides ascertaining the proportion contained in the soils examined, experiments were made in adding 1 % of pure powdered lime. The results may be summarised as follows.

1. The colloidal substances in the soil were precipitated by the lime ;

2. The permeability of the soil increases in approximate proportion to its content in particles that can be removed by washing.

3. The water-holding capacity of the soil is increased.

4. The cultivation of the soil is facilitated absolutely in direct proportion, and relatively in inverse proportion to its content in particles that can be removed by washing.

5. Shrinkage and cracks (*Schwund*) (1) are reduced.

To determine the effects of humus, besides ascertaining the proportion of humic acid it contained, experiments were made in adding to the soil colloidal solutions of humus. The effects noted were the following :

(1) By *Schwund* is understood the property of the soil to shrink as it dries and thus form fissures. (*Ed.*).

1. Humus reduces the permeability of the soil more than clay does (1).

2. Humus increases the water-holding capacity ;

3. Humus tends to make sandy soils compact, and to loosen clayey, soils.

4. As the chief quality of humus is that of swelling with water, it tends, like all colloidal substances contained in the soil, only in a greater degree to increase shrinkage and cracks.

The action of lime on humus is similar to its action on all the other colloidal substances contained in the soil, that is to say, it reduces its tendency to swell, thus considerably lessening its water-holding capacity, and its liability to shrink and crack.

The effects produced by the application of lime are as follows :

1. The disintegration of the humus and the consequent increase of humic colloids and ash ;

2. The disintegrating action of the products of humic disintegration.

3. The better ventilation of the soil ;

4. The formation of compounds soluble in water which arise from the interchange of bases ;

5. The caustic action of the lye which is at first formed ;

6. The increased formation of calcium bicarbonate, $Ca(HCO_3)_2$.

The absorbent power of the soil is affected by the application of lime as follows :

(1) It is increased, when the bases, which are set free, are withdrawn from the soil by means of water or plants ;

(2) It is increased, when new absorbent substances are added, such as loam and manure ;

(3) It is diminished, when the superficies of the colloids is lessened (Deppoldshäuser clay, humic loam, and humic sand), or when the presence of salts of lime soluble in water disturbs the equilibrium between lime and potassium in favour of an absorption of lime ;

(4). It remains unaltered if the interchanged bases are not removed.

Lastly : (5). The formation of a crust is hindered or prevented.

The writer is inclined to believe that the molecule of humus has no part in the chemical interchange of bases. The absorptive fixed bases, when they actually occur, are replaceable.

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(1) Dr. THAER says: « It appears that humus, through its property of swelling, imparts to water a considerable amount of viscosity, which checks percolation to a greater extent than the same amount of clay » (*Loc. cit.* p. 49). (*Ed.*).

2486 CLIFFORD WILLIS. **Alkali Soils.** (South Dakota State College of Agriculture and Mechanic Arts). — *Agricultural Experiment Station Bulletin* No. 126, Brookings S. D. April 1911.

United States

This Bulletin has been prepared by the Agricultural Experiment Station of South Dakota with the view of meeting the continued demand for information concerning the distribution of alkali soils, and the proper methods of handling them. The injury is due to the translocation and accumulation of salts in the upper soil. The alkali is carried to the surface in solution in water, and, as the latter evaporates, is left on the surface.

The more common soluble salts consist of three chief components: sodium chloride; sulphate of soda and sodium carbonate. They are all detrimental to plant growth, the latter being known as "black alkali". Chloride and sulphate of magnesium and calcium chloride are not so harmful. The less readily soluble alkali salts are calcium sulphate, calcium carbonate, calcium bicarbonate, and the carbonate and bicarbonate of magnesium. The greater the evaporation, the more rapidly will the salts accumulate, so that the best treatment is to prevent this as much as possible.

Good surface cultivation will do much to keep it in the subsoil and lower down, where little harm results. Tillage should begin early in the season, because at that time a considerable amount of the salts have been carried into the sub-soil by the spring rains. If the crop has been started early, and good cultivation is practised, it may be brought to maturity before harm or injury is wrought. Mulching has been recognized in irrigated sections as a very effective remedy.

In orchards where alkali is apt to be brought to the surface, shading the ground may be sufficient to prevent great injury. Litter of all kinds has been successfully used. However, it involves more expense and trouble than the simple tillage of the surface to prevent evaporation throughout the season.

These measures however are only temporary and do not remove the excess of salts. Tile drainage affords permanent relief. Flooding an irrigated section will wash the salts deeper into the subsoil, where they lose their harmful effects. Analyses of drainage waters in various sections have shown that they carried large quantities of salts in solution.

E. J. Russel. ***Teart* Land in Somersetshire, England.** — *Nature*, Vol. 87, No. 2187, p. 425. London, 28 September, 1911. 2487

The use of the word " teart " in connection with certain soils was referred to in *Nature* of November 3, 1910 (p. 25), and of May 11, 1911 (p. 364) each time in reference to Mr. C. T. Gimingham's very promising work on problems presented by such lands (1). Dr. E J. Russell informs us that the word is used to denote certain pastures in Somersetshire on which cattle " scour ", or get diarrhoea, badly, whilst on other pastures round about they remain perfectly healthy. Botanical examination of the pastures reveals nothing that can account for the scouring, nor is there any evidence of disease organisms. Only the Lower Lias formation is affected, alluvial pastures all round a Lias pasture being quite sound. Mr. Gimingham considers that it is almost certain that the physical condition of the " teart " soils is at the bottom of the trouble, and advises a continuation of experiments on the effect of surface drainage. The whole question is very baffling and extraordinary, but it is typical of many other pasture problems. Great Britain

Peat Utilization in Germany. (2) — *Journal of the Royal Society of Arts*. No. 3068. pp. 986-987. London, Sept 8, 1911. 2488

Efforts are being made in Germany to improve the cultivation of marshes and moorland. The success attained in this direction in the Netherlands has attracted attention in Germany, particularly since Dutch gardeners and truck farmers have predicted that, were the marshes of Prussia cultivated like those of Holland, the German canned fruit and vegetable industry would conquer the markets of the world. The German marsh and moorlands cover an area of about five million acres. The largest districts by far are in Prussia. Germany

The best quality of peat from German soil, so called air-dry peat, contains about 45 per cent. of carbon, 1.5 per cent of hydrogen, 28.5 per cent. of chemically-bound water, 25 per cent. of hygroscopic water, and small amounts of nitrogen. The annual production of peat in the Empire amounts to about 11 million tons.

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(1) See this *Bulletin* Nov. 1910, pp. 24-26.

(2) See Abstr. p. 218 *Bull.* Dec. 1910; Abstr. 65, *Bull.* Jan. 1911; Abstr. 770, *Bull.* March, 1911.

The Prussian Minister of Agriculture is now engaged in preparing a comprehensive law giving the Government extensive power to stimulate, by direct financial assistance, as well as by the application of every available governmental facility, all efforts for the cultivation of the German marshes and moors, although 90 per cent. of the Prussian high moorlands are in private hands.

2489 M. L. PERVINQUIÈRE. **The Utilisation of Peat. The Mineral Resources of the United States.** (Utilisation de la Tourbe. Les ressources minérales des Etats-Unis). — *Revue scientifique*, 29e Année, No. 11, pp. 330-331, Paris, 9 Septembre, 1911.

United States

The abundant supply and low cost of coal and wood in the United States made it seem for a long time that peat could never rival either of these as a fuel. But experiments made in Europe, and the recognition of the fact that certain kinds of peat have almost as high a calory as inferior kinds of coal now on the market, have brought about a change of opinion. The experiments made by the Geological Service have confirmed the results obtained in Europe by the use of peat in gasogen engines : the Germans have shown that a large portion of the nitrogen contained in the peat could be recovered in the form of sulphate of ammonia when the content is slightly in excess of 1 %, and the Americans have studied their peats in this respect, and ascertained that they frequently contain 2 % of nitrogen and sometimes 3 % (1). Several factories use peat as the fuel for their gasogen engines ; and have succeeded in burning it even when containing as much as 40 % of water ; in Florida, even in the middle of winter, it takes less than three weeks to dry it to this extent.

It is estimated that there are 139 855 sq. miles of peat bogs in the United States ; and over 8 % of this area, or 11 188 sq. miles, the peat is 9 feet deep. If we estimate 200 tons of dry fuel per acre and per foot of depth, the dry peat reserve may be estimated at 12 888 500 000 tons. The cost of peat, near the peat-bog, is about 3 dollars per ton, or a total of 38 665 700 000 dollars (2).

Peat is still very little used in the United States, and is only just beginning to be worked, but it will be a considerable source of wealth for the country. It is already used in the gasogenes of gas-engines, and studies are being made with a view to its transformation into

(1) See this *Bulletin* : March, 1911, Abstr. No. 770 ; and May, 1911, Abstr. No. 1392. (*Ed.*).

(2) $ 4.86 = £1. (*Ed.*).

coke, as is done in Germany, and for the recovery of the many by-products, such as coal-gas, methyl alcohol, acetic acid, acetate of lime, ammoniacal salts, tar and its by-products. Calculations show that 644 million tons of sulphate of ammonia could be obtained from the total peat reserves; the value of which would be 37 million dollars; to be added to that of the peat previously used as fuel in the gasogens. Moreover, peat can be utilised in many other ways: as stable litter, absorbant powder, paper-pulp, natural or artificial manure rich in nitrogen, etc. There are already some paper-mills and litter factories in Michigan and Indiana, where a poor quality peat is used for these purposes; the price of this is the same as that for the better quality used as fuel (1).

The Utilisation of Waterfalls in Iceland and Scandinavia. (Utilisation des chutes d'eau en Islande et dans les Pays Scandinaves). — *La Nature*, No. 1995, p. 89, Suppl. Paris, 19, Août, 1911. **2490**

There are very large waterfalls in Iceland, and schemes are under consideration for utilising two of the most powerful, those of Deltifoss (60 000 HP.) and of Vigaberg (50 000 HP.) for electro-chemical and electro-metallurgical works, similar to those worked by the larger waterfalls in Sweden and Norway. **Iceland. Sweden. Norway**

The most powerful works now existing in Sweden are those of Trollhättan, with an energy of 40 000 HP., but they will soon be surpassed by the works now being erected at Porjus on the Lule Elf with over 80 000 HP. They will be finished in 1914. By that date they will probably be surpassed in their turn by the works which are to be erected at Rjukan in Norway, with an energy of 250 000 HP., for the manufacture of artificial nitrogenous fertilizers prepared from atmospheric nitrogen. The waterfalls at Rjukan are 560 metres high, being the highest in Europe.

Improvement of the Liao River in China. — *The Board of Trade Journal*,, N.° 771, p. 490. London, Sept. 7, 1911. **2491**

The Commissioner of Customs at Newchwang states that during 1910 considerable progress was made in working out a scheme for the improvement of the Liao River, which is of vital importance to **China**

(1) See also : HUGH RYAN, *Reports upon the Irish Peat Industries*. Also : *The Economic Proceedings of the Royal Dublin Society*. Vol. I. July 1907, Part. 10, Leinster House, Dublin. pp. 371-420. (*Ed.*).

the continued prosperity of the place. The improvements proposed include the deepening of the Outer Bar by 5 ft. with a width of 200 ft. the closing of the West Junk Passage, the dredging of the river in certain places, and the strengthening of the narrow strip of land between Duck Island and the harbour in the vicinity of the Chinese railway station.

A careful survey has already been made by the engineer in chief to the Manchurian Government, and he estimates that the total cost will be slightly under 600 000 dollars. The improvement of the upper reaches of the Liao River will be taken in hand at the same time, and for this purpose a grant of 200 000 dollars has been sanctioned by the Imperial Chinese Government.

2492 A. P. DAVIS. **The Engineering Work of the Reclamation Service in the United States**. — *Scientific American*, Vol. CV, No. 7, p. 146. New York, August 12, 1911.

In the North Platte Basin, a storage reservoir has been completed at a cost of $ 3 000 000, which will store over one million acre-feet of water, and will control the entire flood on the North Platte Basin in years of ordinary flow. This reservoir will hold the water that would run to waste in winter, and also store the surplus from melting snow in the months of May and June, for use during the late summer and autumn, when the natural flow of the river is at its minimum.

United States

A reservoir of about the above-mentioned capacity is indispensable to the complete development of the water supply of the North Platte; and the present surplus storage might be used in the development of additional projects in the basin, and in completing the water supply for similar private irrigation enterprises previously instituted.

2493 **Irrigation and Drainage in Egypt**. — *Modern Egypt : by the Earl of Cromer*. London, 1911, pp. 824-825.

In the course of his remarks on Egyptian irrigation, Lord Cromer states that, in order to bring the whole of the cultivable lands under cultivation, it will be necessary to store about 4 000 million cub. metres of water. The dam constructed at Assouan can store one million cub. metres, and other works are in course of

Egypt

execution which will raise its capacity to about 2 ¼ millions of cub. metres.

With a complete system of irrigation no country in the world could rival Egypt as regards fertility.

He then goes on to say:

« In my Report for 1891, after describing the extent to which the productive powers of the country had been increased by irrigation, I added:

« The policy of increasiug the debt of Egypt, which was adopted seven years ago, has been amply justified. I should be the last to wish that the facts which I have narrated above should be used as a justification for reckless borrowing, but they certainly do show that cases may arise in which a quasi-bankrupt State, if it be possessed of great natural resources, may be placed in a position of solvency by adding to its debt, provided always that the money borrowed be judiciously applied. In cases of this sort, the main difficulty generally is to ensure the execution of the proviso. So far as Egypt is concerned, I have no hesitation in saying that the expenditure of this £ 1 800 000 on irrigation and drainage has contribued probably more than any other cause to the comparative prosperity that the country now enjoys. It ensured the solvency of the Egyptian Treasury, and until this was done, no very serious effort was possible in the direction of moral and material progress » (1).

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(1) The sum of 45 000 000 fr. (£1 800 000) seems enormous for the development of irrigation and drainage, unless not only the present benefits conferred by the schemes are considered but also the future advantages. It has been calculated that the irrigation work which was begun in the twelfth century and which has converted Lombardy into one of the most fertile regions of Europe cost all together 1 000 000 000 francs (£40 000 000).

CESARE CORRENTI and PIETRO MAESTRI, *Annuario statistico italiano*, 1864. Torino 1864, p. 398.

The following passage is taken from JOHN NISBET, "*Agriculture of Egypt*". *The Standard Cyclopaedia of Modern Agriculture*. Patrick Wright, Vol. V, pp. 33-34. London, 1909.

" Under the new system of improved perennial irrigation the canals have to be carefully laid, to be well supplied with regulating sluices judiciously placed, and to be cautiously worked. And this irrigation system has to be accompanied by an equally well-planned and well-regulated drainage system for drawing off the water when no longer beneficial to the land ; for, being strongly impregnated with salt from the soil, this water can only be injurious if allowed to remain. In fact, just as in animals the circulating system provides both for a continuous flow of re-oxygenated arterial blood,

Lastly, when once his value had been recognised — that is to say, in a very short space of time — the British engineer secured the sup-

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and also for the withdrawal of deoxygenized venous blood, so, too, must the modern perennial irrigation system of Lower Egypt (greatly improved and practically revolutionized since 1883) provide both for an ample water supply being conveyed to the fields, and also for its withdrawal when the full benefit has been obtained, and only harm can be expected by its being allowed to remain longer.

Even when the present system of summer cultivations was first introduced, it was seen that complete success mainly depended on damming up the Nile at the apex of the delta. The first attempt to erect a *barrage* (1833) failed, but in 1842 a big dam was built about 14 miles below Cairo, spanning the two branches of the Nile just below where the river divides into the Rosetta and the Damietta branches. The water for the irrigation of all that part of the delta lying between the two great branches of the Nile is supplied mainly by the great Menufia Canal. The arches of each bridge were constructed so as to permit the free flow of the water when high, but on the fall of the river they could be closed by iron gates, in order to raise the river level above the dam, and store up the water for irrigation purposes, and thus form a great reservoir for supplying the three main canals intended to irrigate the eastern, the central, and the western provinces of the delta. This *barrage* was not completed or rendered efficient until large works were carried out from 1883 to 1890, since which time the whole of the delta and all that part of Egypt to the north east of Cairo and the south of Zagazig have been made entirely independent of the temporary level of the Nile. And at the same time the "basin" system of irrigation to the south of Cairo has been greatly improved by arrangements which allow the water in basins belonging to a group in one part of the valley to be supplemented during a low flood by the inflow of water through canals led from the next group higher up. A similar *barrage* has been constructed in the upper Nile valley at Assiut, where the great Ibrahimiyeh Canal strikes off to the left of the river, and a large dam has been built at Assouan (completed in January, 1907) for raising the water-level and forming a big reservoir for the irrigation of agricultural land. Work is now in progress for heightening the Assouan dam by 16 ft. which will more than double its storage capacity, and will give sufficient extra water to irrigate during summer nearly one million acres now lying waste in the northern tracts of the delta. Another *barrage* begun at Esneh in 1906 is now being completed (1908), and will add largely to the area of perennial irrigated land.

Both in Lower and in Upper Egypt the most valuable crops are cotton, sugar cane, maize, millet, dates, rice, which all require a high temperature, and some of which take long to ripen, so that water is now needed all the year round.

See also W. Willcocks, *Egyptian Irrigation*, 2nd edition. London and New York, 1899, and Abst. pp. 29 and 30 *Bulletin*, November 1911. [*Ed.*].

port of Egyptian public opinion. The facts were, indeed, so strong as to bring conviction to the minds of the most prejudiced and sceptical. The fellah might fail to realise the utility and significance of some of the reforms instituted under British tutelage, but he knew the value of water to an extent which can perhaps scarcely be appreciated by inhabitants of northern countries. No amount of misrepresentation could persuade him that the man who brought to his fields, in a measure surpassing his wildest expectations, the element for which he thirsted, was not his benefactor.

The British engineer, in fact, unconsciously accomplished a feat which, in the eyes of a politician, is perhaps even more remarkable than that of controlling the refractory waters of the Nile. He justified Western methods to Eastern minds. He inculcated, in a manner which arrested and captivated even the blurred intellect and wayward imagination of the poor, ignorant Egyptian fellah, the lesson that the usurer and the retailer of adulterated drinks are not the sole products of European civilisation; and, inasmuch as he achieved this object, he deserves the gratitude not only of all intelligent Asiatics, but also of all Europeans—of the rulers of Algiers and of Tunis as well as those of India ».

Irrigation in Canada. — *The Times Engineering Supplement.* London, July 26, 1911 p. 23, No. 335. (Seventh Year). **2494**

The programme of work to be undertaken by the Canadian Pacific Irrigation Company during the present season is on a large scale, and constitutes yet another instalment of the scheme put in hand four years ago, whereby 3 000 000 acres of land will be irrigated. When completed, the irrigation system will comprise 4 500 miles of canal, of which up to the present time about 1 500 miles have been constructed. The main canal, 17 miles in length, 120ft. wide at water level, and 60ft. on the bottom, is served by the Bow River, and has its intake at a point on that river about two miles from Calgary, Storage is provided by a reservoir which has an area of three miles by half a mile, and has been excavated to a depth of 40ft. The secondary system of canals, which have a width of 60ft. on the surface, and of 30ft. on the bottom, and a depth of 8ft., has a length of about 180 miles, and to these secondary canals a whole network of distributing ditches has been added. The area for which irrigation is being provided in the section of the scheme now in progress is about 500 000 acres. The total cost of the whole of the work is estimated at over £. 3 000 000. **Canada**

Irrigation farming is also being encouraged by the irrigation scheme of the Southern Alberta Land Company in the Medicine Hat district. In this case also the supply is obtained from the Bow River, on which a dam has been built at a point 40 miles from Calgary. A feature of the main canal is the deep cut over 1/4 mile in length, with a maximum depth of 62ft., and when work on this is completed in the near future the water will be turned into the main reservoir, which has a capacity of 360 000 acre-feet. The area proposed to be irrigated is 400 000 acres, and the capacity of the main canal is 1 000 cub. ft. per second.

Irrigation in British Columbia.

The development of the fruit industry in British Columbia is also largely dependent on the provision of the necessary irrigation, and many schemes of this character have now been carried out, notably in the White Valley, the Thompson Valley, at Vernon, and at Kelowna and Penticton in the Okanagan Valley, The importance of these irrigation systems lies in the fact that in the "dry belt" of the American Continent, the region extending between the Rocky Mountains and the coast, the rainfall is so small, ranging from 9in. to 10in. annually as a maximum, down to about 2in, annually as a minimum, that without irrigation the land would be worthless for the purposes of the fruit-grower. The area of Canada which is being opened up to fruit-farming by these means is about 200 miles long by 150 miles wide. The greater part of the water to be eventually made available for the purposes of this industry is precipitated in the form of snow on the mountain lands during the winter months, and unless preserved, would merely run to waste by flooding the rivers and watercourses for a few weeks in spring.

An interesting, although comparatively small, irrigation scheme has been carried out recently at Snohwash, which is 3 000ft. above sea-level, and is situated about 30 miles north of the Canadian Pacific Railroad. Here advantage has been taken of the existence of a natural lake, with an area of about 1 000 acres, and a capacity of nearly 6 000 million gallons, to provide water storage for a large acreage of land. The work of constructing the necessary dam and flumes was beset with considerable difficulty, as, owing to the absence of roads within ten miles of the site, the plant and that portion of the materials brought from a distance, had to be carried on pack mules, while the men engaged in the work were obliged to establish a camp on the mountain side. The site selected for the

dam was a narrow outlet 100ft. in width between the rocky walls of a gorge, and the method of construction adopted was that known as a rock fill crib, the crib being made of timbers cut on the shores of the lake, and filled in with small pieces of rock broken on the spot. The foundation for the dam was first of all cleaned off to bed rock level, and the base timbers fastened to the foundation with iron bolts. The whole of the timber formation was afterwards bolted together in a similar manner. The dam, which in section forms a trapeze, is 62ft. thick at base, and 22ft. from foundation level to the top. In the final stages, the water slope of the dam was faced with hewn logs, laid close together and caulked with oakum, and this in turn was strengthened by a facing of gravel, with the object of making the construction absolutely watertight.

The outlet from the dam to the flume consists of two 24in. steel pipes with the necessary regulating valves. After leaving the outlet, the water is carried in a wooden flume with a bottom width of 6ft. and capable of carrying 3ft. of water, for a distance of about ten miles on a ledge blasted out of the side of the gorge in which the Dead Man's river makes its bed. The flume has a capacity at the normal rate of flow of 77 cub. ft. per second. At the lower levels the water channel takes the form of an open canal, and this particular scheme includes about 20 miles of main canal, and 30 miles of distributing ditches serving an area of about 3 000 acres. Provision has to be made throughout this canal system for dealing with sudden floods and freshets beyond the capacity of the canal, and an elaborate system of under and over drains has been provided, as well as a large number of regulating gates. In several places it has been necessary to carry the canal across deep gorges in high trestle-bridges. The water is to be carried under the bed of the thomson river, to the south "bench" lands, by means of a pipe line, and it is hoped that this auxiliary scheme will be completed during the present year.

Thompson Valley Reservoir.

A second reservoir scheme has been designed for the purpose of providing the main water supply to the Thompson Valley area. The plan adopted in this case is to convey the water from the river for a distance of eight miles in canal, and to deliver it to the Twin Lake reservoir, which has a capacity of about 310 million gallons. To impound the water in this case, an earthwork dam 550ft. in length, with a maximum height of 21ft. has been built and is

made water-tight by a puddled clay core 6ft. in thickness carried down into the clay subsoil. This scheme was successfully completed some little time ago. In conjunction with this project the supply of a minor stream has been utilized, and arrangements have been made for storage in a small reservoir with a capacity of 25 million gallons, the work in this case necessitating the construction of a dam 150ft. long. with a maximum height of 21ft.

The whole of the work referred to has been carried out by the British Columbia Development Association, and the storage now existing will irrigate some 5 000 acres. The work has been designed and carried out under the superintendence of Mr. O. Barnes, the engineer to the association, at a cost of about £100 000. A third project is about to be put in hand in the Nicola Valley, 80 miles to the south of the Snohwosh valley, where, between Nicola Lake and Stump Lake, there is a large area dependent on the provision of irrigation for development. The site selected for the reservoir is Stump Lake, and the work here will be similar in character and in storage capacity to that already successfully carried out at Snohwosh.

2495 F. H. NEWELL, **Reclamation and Home-making in the United States. I. Review of General Conditions in the Reclamation Service.** — *Scientific American*, vol. CV, No. 7, pp. 144-145. New York, August 12th, 1911.

United States

One of the most far reaching but little known works of the United States, is that of the reclamation by irrigation of arid lands. These lands form about a third of the total area of the United States and although only a small proportion can be irrigated, yet the farms and homes which may be created have such great value as to become a notable addition to the wealth of the nation.

The public lands thus reclaimed are not sold, but are given away to actual homesteaders. The cost of reclamation, however, must be returned in ten annual instalments. Thus, for example, if it has cost $30 an acre to bring water to a given tract, and it is found that 40 acres is adequate for the support of a family, a man is allowed to file upon this 40 acre tract ; title is obtained after five years' residence and cultivation, and payment has to be made to the government of the cost of reclamation, which in this case is $1 200, in annual payments of $120 each. He obtains an opportunity of acquiring a home and a piece of land which rapidly increases

in value, because of the fact that as other people flock in and take up the adjacent lands, a relatively dense population is established; towns grow up, and there is an increment of value beyond the result of his own efforts, for these lands ultimately are worth $100 or more per acre.

There has already been invested about $60 000 000 in this work, and this investment is being increased at the rate of approximately $1 000 000 a month. This money is not being paid directly by the tax-payers, as it is not derived from domestic or foreign imports, but from the disposal of public lands. The moneys thus obtained are credited to a fund in the treasury, placed at the disposal of the Secretary of the Interior, and expended through what is known as the Reclamation Service, an organization composed of engineers with the necessary technical and clerical assistants.

The law authorizing this work, known as the Newlands Act, from Senator Francis G. Newlands of Nevada, was passed on June 17th, 1902. It is very general in character, calling for certain results and laying down a few broad lines to be followed.

In carrying out the objects of the Reclamation Act, and embodying the ideas therein contained in feasible structures, there have already been built reservoirs for conserving waste waters, and having a capacity such as would cover four and one half million acres with water one foot in depth. To distribute this water to the land, or take it from various streams, there have been constructed nearly 350 miles of canals of large size, that is to say, carrying out over 800 cubic feet per second; while in small canals or distributaries, there are several thousand miles. The tunnels by which the water is carried under mountain masses or through obstacles aggregate in number nearly 70, with a total length of 100 000 feet. There are thousands of smaller structures, such as gates, turnouts, flumes, and bridges; each of which has required more or less engineering skill and forethought. The material excavated in building the canal system aggregates 60 million cubic yards of earth, and nearly 5 000 000 yards of loose rock and the same amount of solid rock. In building the dams and other structures, there have been used over a million barrels of cement.

These figures will give some idea of the magnitude of the work.

2496 R. H. Forbes and Samuel Fortier. **Irrigation in Arizona.** — *U. S. Dep. of. Agr. Office of Experiment Stations*, Bulletin 235: 83 pages. Washington, June 30th, 1911.

United States

This Bulletin is one of a series of reports prepared by the Experiment Station Office of the United States Departement of Agriculture, for the purpose of giving general information regarding: the opportunities for settlement on irrigated lands in the several Western States and Territories, the cost of land and water, the establishing of homes in these lands, and the crops grown.

2497 United States **Nineteenth National Irrigation Congress at Chicago.** — See above, Abstr. 2429.

2498 **Irrigation of Golodny Steppe.** (Brit. Diplom. Rept.) — *The Board of Trade Journal*, No. 765; p. 185. London, July 27, 1911.

Russia

A law, dated 14 July, authorises the Russian Government to expend a sum not exceeding 12 500 000 francs on the completion of irrigation works in the north-eastern portion of the Golodny Steppe, in continuation of its policy of developing this portion of the Empire, and of encouraging cotton cultivation.

2499 Carl v. Klinckowstroem. **Bibliography of the Divining-Rod: With an Introduction by Dr. Ed. Aigner on the Present State of the Question.** (Bibliographie der Wünschelrute: mit einer Einleitung von Dr. Ed. Aigner: der gegenwärtige Stand der Wünschelruten-Forschung. München, 1911).

Germany

This little book (146 pages) contains an exhaustive catalogue of all the books and journals published since 1532 up to the present which bear on the problem of the divining-rod. The only previous work of the same kind is *Aretin's* " Beyträge " published in 1807.

The following is a brief outline of Dr. Aigner's introduction, which is valuable because of its perfectly unbiassed treatment of the subject.

That the water-finder repeatedly indicates the presence of water, where in fact it is found, is undeniable; it is equally undeniable that he sometimes fails. The theory that the movements of the

water-finder are due to subconscions impressions arising from an objective source would seem to be justified; for any one who tries to voluntarily induce the movements of the rod finds that a little practice enables him to reproduce the whole process without any visible motion of the hands.

As exact investigation is only possible by the application of methods which leave the subjective process in the background, the following experiments were carried out:

a) Several water-finders worked separately over the same ground.

b) Comparison of the results of technical research with those of the waters-finders.

c) The finding of water-pipes.

d) The discovery of damage to water-pipes.

The results obtained were negative in many cases, but not such as to warrant any final verdict. The factors causing the phaenomenon are entirely unknown, and the negative results of experiments no less than the positive will gradually lead to the determination of the boundaries within which it takes place.

A final solution of the problem can never be reached except by the substitution of an objective apparatus for the human organism. Differences of temperature, terrestrial magnetism, gravitation, meteorological and electrical phaenomena are all open to one fatal objection: the working of suggestion.

The investigation becomes more hopeful if we turn to those natural phaenomena which are affected at a distance by water.

a) A thunder cloud is frequently seen to follow the course of a river.

b) Water-courses frequently attract electric discharges from the clouds.

c) Airshipmen have observed in a cloudy sky certain gaps exactly corresponding to water-courses lying vertically beneath them.

d) The so-called γ rays emitted by radioactive bodies are lessened by various substances in or on the earth's surface, specially by water.

These facts conclusively prove that water brings about a change of condition in the overhanging atmosphere, and efforts are now bring made to construct an apparatus which shall adequately re-act to this change. The following are proposed:

1) An automatic water-finder, which depends on the variations of the electric earth-currents, with which an exchange of electricity between atmosphere and earth is connected.

2) The telephone: *a*) employed as the receiver of acoustic waves arising from the subterranean water; *b*) with the microphone introduced into a conductor, having both ends in contact with the earth.

3) The galvanometer.

4) The sidereal pendulum.

5) The transmission of electric waves into the earth, and their reflection from water and minerals.

6) A new electrometer for statical charges.

It is only this last apparatus which seems of much importance. It has proved the existence of certain relations of radioactive phaenomena hitherto unknown. These relations show that what is denied by the opponents of the divining-rod, namely " a mysterious emission "of rays over water, in point of fact takes place.

It would seem therefore that the human subject may be unconsciously affected by radioactivity in the same way as this apparatus, and that the ultimate solution lies in this direction.

2500 Olsson. **Electrified Artificial Rain for Agriculture. A New System of Irrigation.** — *Scientific American.* Vol. CV, No. 8, New York, August 19, 1911.

Reference has repeatedly been made to experiments carried on by Sir Oliver Lodge and others on the influence of electricity on the growth of plants (1). Mr Emilio Olsson of Buenos Aires, Argentine Republic, at present in the United States, has, of late years, been giving his attention to the practical development of a process in which it is proposed to make use of electrified water for sprinkling fields. The inventor claims that his experiments demonstrate the practical utility of such a procedure. The benefits which are said to be secured are two-fold. First, there is a direct advantage to the plants, and secondly, Mr Olsson states that, according to his observations, various harmful insects and other organisms are destroyed by this process.

Argentina: Buenos Aires

The need of artificial irrigation is severely felt in many places, where, owing to the nature of the climate, long terms of drought have to be contended with. It is particularly in such districts as these that Mr. Olsson proposes to introduce his system by the aid of which he expects to increase the crop and to combat effectually

(1) Compare: *The Science and Practice of Farming during* 1910 *in Great Britain.* Intern. Inst. of Agriculture. Rome. *1910,* p. 225.

drought, insects and other troubles. The cost of the Olsson system is estimated at a figure which is quite moderate as compared with the benefits to be derived. The cost of installation for the sprinkling apparatus is figured at $ 50 to $ 100 per acre, according to local conditions,

The system is very simple. The water is raised to a suitable height by a motor or traction engine. The supply may be drawn from a river, stream, artesian well, or any other suitable source. Two high towers may be installed from which pipes are suspended by means of suitable supporting cables. The pipes supply circular spray nozzles which revolve automatically, and five to ten acres of land can readily be thus supplied with an evenly distributed shower of water.

When it is desired to use electrified water, a reservoir is used, into which the water is pumped, to be subsequently distributed in the manner indicated above. The reservoir consists of an iron tank placed on an insulated support and charged from a dynamo supplying 0.5 ampere at 110 volts. The iron wall of the tank serves as positive pole; the negative pole consists of a copper wire insulated all except the tip. It is claimed that certain chemical reactions take place in the water, with production of oxygen, ozone and hydrogen peroxide at the anode, and that certain of the products formed are beneficia to the plants; the inventor suggests that this electrification of the water would tend to purify it and render it better adapted for drinking purposes.

Mr. Olsson has installed his apparatus in a plantation near Buenos Aires and states that by the use of six sprinkling nozzles at a height of 5 metres above ground, some six hundred acres of ground under cultivation were treated with very beneficial results. The apparatus has also been adopted by the municipality of Buenos Aires and is giving satisfaction in the public parks and gardens in that city. Mr. Olsson also mentions that during the long drought from which the republic suffered for over six months in 1910, he was able to produce a very fine crop of alfalfa and vegetables and to supply the owners of race horses with fresh fodder. By installing a system of artificial irrigation over some part of their crop, farmers should be able to insure themselves against drought, falling back upon artificial sprinkling in case natural rain fails.

Incidentally, the interesting suggestion is made that the water line be used at the same time to carry the current for lighting and other purposes.

The invention has been protected by a number of patents, and

Mr. Olsson has shown much perseverance in working out the details of his method.

2501 W. BATESON. **Organisation of Agricultural Science.** — *Nature*, Vol. 87. No. 2186, p. 402. London, September 21. 1911. (Notes from Opening Address to the Agric. Subsection. Meeting of Brit. Assoc. Portsmouth Sept. 1911).

«It is not in dispute that wherever agricultural science has been properly organised valuable results have been attained, some of very high importance indeed; yet with full appreciation of these achievements, it is possible to ask whether the whole outcome might not have been greater still ». Agricultural bulletins purporting to give the results of trials and researches are mostly dull reading and their possible utility does not compensate for the time and expense incurred.

Great Britain

It is doubtful whether public opinion, now so much enlightened, is satisfied by the rapid publication of trivial details, while the conditions laid down in 1857, when the experimental Stations of the U. S. were established, and which insisted upon the publication of reports of progress every three months, would scarcely find favour at the present day, even in the case of the most prolific discoverer.

For " not only does such a rule compel premature publication — that nuisance of modern scientific life — but it puts the investigator into a wrong attitude towards his work. He will do best if he forget the public and the newspaper of his State or Territory for long periods, and should only return to them when after repeated verification he is quite certain he has some things to report ".

In all sciences, whether pure or applied, research is nearly always a very slow process. Much more must material advance be slow in agriculture; the research of the present day can aspire no higher than to lay a foundation for the use of succeding generations.

Sometimes there come moments when obvious improvements in practice can at once be introduced, as in the cases of the discoveries of Pasteur and of Mendel.

Facts must be adhered to and the public made to understand that though something can be done already to help the practical man, the realisation of the hopes of science can only be reached by long and strenuous effort.

" Nowhere is the need for wide views of our problems more evident than in the study of plant diseases. Hitherto this side of agriculture and of horticulture, though full of possibilities for the

introduction of scientific method, has been examined only in the crudest and most empirical fashion. To name the disease, to burn the affected plants, and to ply the crop with all the sprays and washes in succession ought not to be regarded as the utmost that science can attempt. There is at the present time, hardly any comprehensive study of the morbid physiology of plants comparable with that which has been so greatly developed in application to animals.

The nature of the resistance to disease, characteristic of so many varieties, and the modes by which it may be ensured, offers a most attractive field for research, but it is one in which the advance must be made by the development of pure science, and those who engage in it must be prepared for a long period of labour without ostensible practical results. It has seemed to me that the most likely method of attack is here, as often, an indirect one. We should probably do best if we left the direct and special needs of agriculture for a time out of account, and enlisted the services of pathologists trained in the study of disease as it affects man and animals, a science already developed and far advanced towards success. Such a man, if he were to devote himself to the investigation of the same problems in the case of plants, could, I am convinced, make discoveries which would not merely advance the theory of disease-resistance in general very greatly, but would much promote the invention of rational and successful treatment ".

Plant Industry in the United States. — *The Agricultural News*, Vol. X, No. 239, p. 207. Barbados, June 24, 1911. 2502

The following extracts contain a few of the many matters of interest to which reference is made in the *Report of the Acting Chief of the Bureau of Plant Industry, United States Department of Agriculture*, for 1910:

United States

Work with Nodule-forming Bacteria (1), Pure cultures of nodule-forming bacteria for inoculating legumes have been distributed during the year, and additional data have been gathered concerning the limitations of successful inoculation. Especially with alfalfa in the eastern States, it has been found that successful inoculation is correlated very closely with the reaction of the soil to neutral litmus paper. The inoculation of crimson clover seems to show no correlation with the litmus reaction, while the inoculation of vetch is

(1) Cp. Abstract. No. 1402, *Bulletin*, May, 1911. (*Ed.*).

about half-way between these extremes. More detailed field work in connexion with the experimental distribution of pure cultures for inoculating legumes will be undertaken the coming year.

Relation of Acidity of Soils to Grazing Plants. In the progress of the co-operative experiments between the Forest Service and the Bureau of Plant Industry on the artificial re-seeding of denuded grazing lands in the National Forest, it had been found in 1908 and 1909 that the failure of certain forage plants on certain experimental areas could not well be attributed to improper conditions of moisture and temperature. On the suspicion that the conspicuous differences of success or failure might have been caused by differences in the acidity of the soil, a study of the acidity of these areas was made in 1910, with wholly conclusive results. It was found that the areas on which Kentucky bluegrass and timothy failed were acid, and that on these same areas redtop grew with great success, while, on the other hand the areas on which redtop made a poor growth and timothy and Kentucky bluegrass succeeded were neutral or slightly alkaline in their chemical reaction. It is clear from the season's study, that acidity of the soil is a factor of the greatest importance, hitherto unconsidered, in the seeding of these mountain grazing lands. Hereafter, experimental sowings will be made with reference to conditions of acidity as well as those of temperature and moisture.

Fortunately, nature herself has furnished a guide to the acidity of these areas. There are certain wild plants which grow only on acid lands, others which grow only on neutral or alkaline lands, and the presence or absence of these indicative plants is an excellent practical guide for field work.

Testing Methods of Maize breeding. The various methods of maize breeding that have been put to practical tests during the past ten years are showing their comparative merits.

The yields of this fall will show the relative production of maize that has been undergoing improvement by different methods of close breeding and crossing. It is well established that the retention of half the seed of ears tested as to production is important. It allows further testing under different seasonal condition and isolation or crossing of individuals of improved merit. Indications have been found that power to yield well is, with corn, a Mendelian character and that when two homozygous individuals, related or unrelated, are mated, the progeny produces heavily.

Florida Citrus Fruit. Fields investigations were made a feature of the season's work. In several districts the Bureau workers made careful inspections of the work of picking gangs and packing

houses, pointing out the amount of injury due to careless work and the effect of such injuries. As a result of these demonstrations and instructions, the work done by picking gangs showed material improvement during the season.

The results of the washing experiments show considerable variation, depending upon the character of the work. In some sections only slight decay resulted from the washing of fruit, while in others, where the work was carelessly done, a material loss from decay followed. Where the machinery was operated at high speed, or where the wash water was not changed often enough to ensure cleanliness, decay was always materially increased. A summary of all the data obtained, shows that washing increases the chance for decay, and should only be resorted to when absolutely necessary to place the fruit in marketable condition. When fruit must be washed, the work should be done with the greatest care, both in the handling and the operation of the machinery, and in using clean water.

The shipping experiments consisted of the forwarding of a series of boxes to Washington, each series containing carefully handled and selected fruits, packed very carefully under the supervision of the Bureau workers, and the same fruit picked, handled and packed under ordinary commercial packing-house conditions. The effect of delay in packing and shipping was investigated. Inspections were made on the day of arrival at Washington, and one, two and three weeks thereafter, the fruit being held under ordinary market conditions. While the data obtained this season are rather meagre, they are consistent and cleancut, and show that the preservation of the fruit depends on immediate packing and shipping and careful picking, packing, and handling.

Acclimatisation Experiments in the United States. (Seeds and Plants imported during the Period from January 1 to March 31, 1910). *U. S. Deptm. of Agr., Bur., Plant Ind., Bull.* No. 207, pp. 100. Washington, 4 May, 1911. **2503**

This *Bulletin* contains lists of seeds and plants imported into the United States from January to March 1910, the purpose of the importations being mainly to secure hardy, or otherwise serviceable, plants for acclimatisation or breeding purposes. The list contains, among specially noteworthy importations, the following: Seed of fruit trees from Kashmir, India, namely, *Prunus Cerasus, Amygdalus Persica, Prunus armeniaca, Pyrus communis, Malus syl-* **United States**

vestris ; drought-resistant Pears (*Pyrus* spp.) from China, where they are cultivated among the hills of S. W. Manchuria as far as 43-44° ; the fruits are hard, late, and keep all the winter. A new form of *Malus baccata* from Siberia, used in Russia (St. Petersburg) for hybridization with *M. prunifolia*, was introduced to obtain a harder race of Apples. From Sebastopol, Crimea, came *Pyrus salicilifolia*, a drought-resistant wild pear; also *Amygdalus davidiana* and *Crataegus orientalis*.

Of Avocados (*Persea americana*), 42 varieties have been obtained from Florida, where they had been grown from seed from Cuba and Costa Rica. Nine varieties of Cherimoya (*Anona Cherimolia*) from Peru have also been introduced.

Tubers of potatoes (*Solanum* spp.) came from Chile.

Several varieties of Soy Beans from Manchuria, of wild Clovers from the Turkish mountains, and a wild *Medicago* from the dry mountainous regions of Algeria, have been obtained. From the Crimea come two species of *Medicago;* one, *M. orbicularis*, from Balaklava, is an annual, growing on hill slopes and stony, rather sterile, plains. It germinates in early winter and ripens in early summer. It is much liked by sheep, and is hayed for horses and bulls. It may be of value as a winter forage crop in the mild-wintered regions of the United States, and especially in California. It s found in the Mediterranean countries and western Asia.

A wild Rice (*Zizania latifolia*) has been introduced : it is a native of China and Japan, where it is extensively cultivated for its edible shoots, and also for a fungous growth which develops on the inflorescence and is said to be edible when young.

Limonia acidissima (Rutaceae), from Kirkee, India, will be especially useful for breeding purposes. It is a shrub or small tree. The fruits are very small, but are occasionally used as a condiment by the natives. The wood is hard and suitable for parts of machinery where great strength and toughness are required. This plant belongs to the Orange family and is introduced primarily in connection with the experiments now in progress in the breed.ng of new types of citrus fruits and stocks for them. It occurs on dry hills in the northwestern Himalayas, up to 4000 ft., and in some other parts of India; also in Yunnan, China.

From Japan was imported the « Yuzu » (*Citrus* sp.), a large evergreen tree bearing round, medium sized fruit, which is very acid and has a coarse, thick rind; it is so hardy that ripe fruit can be seen on the trees when there are two feet of snow on the ground. In some parts of Japan the « Yuzu » is considered a better stock than *Citrus trifoliata*.

A wild Pomegranate (*Punica protopunica*), probably a prototype of the cultivated pomegranate, was introduced from the island of Socotra (1).

"Ohanez" grapes, fumed for their carrying and keeping qualities, have been introduced from Spain. The black "Monukka" seedless grape from the Royal Horticultnral Society's houses. at Wisley, England.

A very hardy race of olives, capable of withstanding a temperature of about—2°F., comes from the Crimea.

Royal Agricultural Society: Members' Annual Visit to Woburn. — *Mark Lane Express, Agricultural Journal*, Vol. 106, No. 4166, p. 169. London, July 31st, 1911. 2504

Although the prolonged drought has been very severe upon the light sandy soil, of which the Woburn Farm principally consists, the effects have not been as disastrous as one might have expected, and came as a surprise to those members of the Royal Agricultural Society who were conducted round the farm by Dr Voelcker on their annual visit.

Great Britain: England: Bedfordshire

It was found possible, to show quite good crops, for the season, of mangold and sugar beet, and to obtain at least a « plant » of swedes. Wheat, for this light land, was good, and the crop, while short in the straw, stood up well. Barley and oats both suffered much, and were very short in straw. Pastures were of course burnt up, but the hay crop was obtained in good condition, while there was an excellent crop of clover hay on one field, which has just been cut a second time for hay.

On the continuous wheat and barley plots (Stackyard Field, thirty-fifth consecutive season), the most striking feature (in addition to the well-known illustration of the value of lime on a soil rendered acid by the use of ammonia salts year after year), has been the benefit resulting frnm the employment, in a dry season such as the present, of farmyard manure, in comparison with artificial fertilisers. The latter have, owing to the absence of moisture, largely failed to show their full effect, whereas farmyard manure, through holding the moisture in the land. has produced a better

(1) See above, Abstract 2401.

crop than usual (1). Another point of interest in connection with the wheat crop is the comparative excellence of the plot, which for the last four years, has had an application of 1 cwt. per acre of sulphate of potash with 1 cwt. per acre of nitrate of soda. Previous to 1906 this plot had not received any manure for twenty years, and, on the other plots, manured with mineral fertilisers, potash salts had been given in conjunction with soda, magnesia and other salts. It was considered desirable to see if the land lacked potash, and the good crop now obtained on this plot (11a) would seem to indicate the desirability of using potash in some form for wheat. This is not, however, as yet verified in the corresponding barley plot.

A series of green-manuring experiments has been started in this field as a complement to those already carried on for several years in another field (Lansome Field), and which went to show that on the light land the best corn crop does not follow the ploughing-in of a leguminous one like tares, but of a non-leguminous one (mustard). In the new experiment the green crops are fed off with sheep instead of being ploughed in, and wheat will follow.

Of much interest at the present time will be found the experiments on the growing of sugar beet. Three different varieties have been drilled at three different distances apart.

In a rotation experiment in this same field there is a nice crop of barley following swedes fed on the land. On one half the sheep had corn (oats and barley) given them, on the other half they had cake (linseed cake and cotton cake). There is little to choose between the two halves in the barley crop so far as appearances go, but the cake fed portion is at present distinctly greener and less mature.

Another experiment in Stackyard Field comprises the comparative trial of different nitrogenous top-dressings on wheat, the new materials, nitrate of lime and calcium cyanamide, being tried both alone and mixed, and side by side with nitrate of soda and sulphate of ammonia. The excessive dryness of the season has, however, prevented the full action of the dressings, these not having told as much as usual.

(1) The different nature of the soil (at Woburn the soil is sandy, whilst it is clayey at Rothamsted) render it very instructive to compare the results obtained at the two places, from the experiments on cereals carried out during a hong series of years. See Abstr. 2507. *Bulletin* for July 1911.

On Lansome Field the green-manuring experiments are being continued, and four acres of potatoes have been set aside for experiments on spraying against «potato disease».

In Road Place Field there are nice strips of mangolds and sugar beet; the land here being of heavier character than that of Stackyard Field.

Since the last visit paid by the members to the farm, the cattle-yards, which were then open, or nearly so, have now been covered in, and divided into partitions. Along with the existing and specially-constructed feeding boxes, this further accomodation provides admirable facilities for the carrying out of feeding experiments on cattle, and it is the intention of the committee to renew work in this direction at an early date,

E. Parke and B. Dyer. **Manuring of Oats and Mangolds.** (*Experiments at Kineton, Warwickshire,* 1910), Abstr. — *The Journal of the Board of Agriculture,* Vol. XVIII, No. 5, p. 415. London, August 1911. 2505

These experiments have been carried out since 1901. When the farm was taken over it was in very poor condition, owing to long-continued neglect of manuring. The soil consists of heavy clay loam poor in available phosphoric acid, but indicating, on analysis, a sufficiency, for the present, of available potash. The experimental plots have been marked out from year to year in various parts of four different fields as convenience of cropping dictated. Great Britain: England: Warwickshire

In the case of the oats, the crop was spoilt by weather in 1909. In the other eight years the average crop with no manure was 38 3/4 bushels per acre; with 3 cwt. superphospate per acre it was 49 bushels; 1 cwt. nitrate of soda in addition increased this to 56 3/4 and 2 cwt. nitrate of soda to 65 bushels. In the case of the mangolds the plant failed in 1906 and 1909, and only the average of the other seven years is considered. The crops were as follows:

	Per acre tons	cwt.
No manure	17	16
4 cwt. super	24	10
4 cwt. » and 2 cwt. nitrate of soda	32	2
4 cwt. » and 6 cwt. »	43	7

Dr. Bernard Dyer remarks that the experiments which are being continued, appear to show that even land that has become, through bad farming locally notorious for its poverty, may be capable of

yielding abundant crops and a good profit, if treated with the proper fertilisers.

2506 **Manuring of Seeds Hay** (*Midland Agric. and Dairy Coll. Kington, Derby, Bull.* 2, 1910-11). Abs.: *The Journal of the Board of Agriculture.* Vol. XVIII, No. 5, p. 416. London, August 1911.

Great Britain

This trial has been carried out during four years at twenty centres altogether, in order to find whether seeds hay could be profitably manured, and if so, the best mixture for the purpose. Twelve plots of one-twentieth of an acre (2.023 ares), have been manured at each centre, care being taken to choose land as even as possible in character. Two plots were left unmanured, two received nitrogen and phosphates, and six complete dressings of varying composition. Taking the average of the twenty trials, the most profitable results were given by the following two complete mixtures: 1) 100 lb. sulphate of ammonia, 208 lb. superphosphate, 200 lb. kainit per acre; 2) 100 lb. sulphate of ammonia, 208 lb. superphosphate, 50 lb. muriate of potash per acre. These both gave an increase of about 10 cwt. of hay over the unmanured plot, which, at £ 3 per ton, is calculated to leave a profit, apart from residual value, after allowing for the cost of the manures, of about 10s. per acre.

2507 N. J. Crahay and Durieux. **On the Use of Artificial Manures in Forestry.** See below, Abstr. 2708.

2508 **Low-Grade Fertilizers are Expensive** (1). — *U. S. Deptm. Agr. Exp. Sta. Work, XLVI - Farmers' Bull.* 457, pp. 24 (5-7). Washington, July 10, 1911.

United States

The work of the experiment stations has clearly demonstrated that it does not pay to buy low-priced, low-grade fertilizers.

B. E. Rose, from a comparison of the composition and cost of fertilizers on sale in Florida, shows that the high-grade fertili-

(1) Compiled from: *Indiana Stat. Bul.* 148; *Massachusetts Sta. Bul.* 135; *Mississippi Sta. Bul.* 142; *Missouri Sta. Bul.* 91; *New Hampshire Sta. Circ.* 12; *New York State Sta. Bul.* 230; *Vermont Sta. Bul.* 254; *Univ. Rec.* [*Florida*], 5 (1910), No. 3, p. 97: *Maryland Agr. Col. Quart.* 1911, No. 51. [*The Author*].

zers for but little more than 1/3 advance in price over the cost of the low-class goods, furnish 2/3 more plant food and 5/6 more commercial value. Classifying the 127 brands of fertilizers examined by him during one year, professor Rose found the following results:

Class of fertilizer	Nitrogen — %	Available phosphoric acid — %	Potash — %	Total plant food — lbs.	Average Selling price per ton — Dollars	Average Station valuation — Dollars	Excess of selling price over valuation — Dollars
Low grade . . .	1.13	8.28	2.50	11.9	24.50	16.85	7.65
Medium grade. .	2.32	8.72	3.66	14.4	30.00	24.84	5.16
High grade . . .	4.00	8.72	10.00	21.0	36.50	32.70	3.80

An examination of fertilizers sold in Vermont in 1910 showed that the medium-grade goods for 1/9 advance in price over the cost of the low-grade brands, offered 1/5 more plant food and 2/5 more commercial value. The high-grade fertilizers for 3/7 advance in price over the cost of the low-class goods, furnished nearly 3/5 more plant food and almost double the commercial value.

From an examination of fertilizers sold in Massachusettes in 1910 H. D. Haskins shows that nitrogen cost 8.96 cents, available phosphoric acid about 2 cents, and potash 1.9 cents per pound more in the average low-grade fertilizer than in the average high-grade goods.

A bulletin of the Missouri Station calls attention to the fact that there is a great demand in that State for cheap fertilizers. This is supplied by a low-grade fertilizer containing about 0.82 per cent of nitrogen, 7 per cent of available phosphoric acid, and 1 per cent. of potash, and selling for 19 dollars per ton. The station valuation for this fertilizer is 12.88 dollars.

Bulletins of the Mississippi Station, of the Indiana Station and of the Maryland Agricultural College also unanimously state that the purchase of the so-called cheap fertilizers is certainly never advisable. Not only are low grade fertilizers more expensive as regards first cost of plant food, but they are more costly to handle per unit of plant food supplied, than the high-grade fertilizers, on account of the larger amount of worthless matter which they contain.

2509 **The Guano Industry in Peru.** — *Peru To-Day.* No. 4, pp. 38-39. Lima. June, 1911.

Peru

For the last fifty years the guano industry has constituted the greatest of national products.

The exports for the last four years are:

1907	Tons	97 031
1908	»	76 108
1909	»	50 378
1910	»	61 578
1911	»	60 000 (about)

The Government is very desirous of applying this fertilizer to the agricultural development of the country, and has authorized a company to operate in the Republic for the supply of guano to farmers, just as it is taken from the deposits.

Some 30 000 tons of guano are extracted annually for the national agriculture (1).

3510 **Herring Manure in Japan.** (L'Engrais de hareng au Japon). — *L'Engrais*, 26e An. No. 34, p. 945. Lille, 25 Août 1911.

Japan

Although Hokkaido herring manure represents scarcely 10 % of the whole amount of fertilizers sold at the present time, it serves always as the base for calculating the price of other manures.

The annual herring harvest is estimated, on an average, at about 4 000 000 bushels, of which 75 % are caught at Hokkaido and 25 % off the Sakhalin Islands.

At Hokkaido, the fishing season consists of three periods, the first begins about the middle of April, the second at the end of that month, and the third at the end of May.

Only about 20 % of the fish taken are used for human consumption; the rest are employed as the organic manure in rice cultivation. The herring harvest of 1910 was very poor (2 500 000 bush). That of 1911 was average.

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(1) The guano Esported from Peru in 1907 was valued at £392 845; and in 1908 at £265 000. *The Statesman's Yearbook for 1911*, p: 1106. (*Ed.*).

T. GRIFFEL. **The Utilisation in Agriculture of Waste Products.** (Utilisation agricole de quelques déchets). — *Journal d'Agric. pratique* 75e An. N. 33 pp. 200-202. Paris. 17 Août, 1911. 2511

The data furnished by the writer have been arranged in the following table.

I. *Animal Residues*

Nature of residue analysed	Nitrogen %	Phosphoric Acid %	Potash %	Price in frs. per 100 kg.
Knacker's yard refuse	3.53	»	»	»
Meat meal	9.05	»	»	6.50
Glue residue	5.40	1.28	»	10.00
Bat Guano	7.00	»	»	17.00
Rabbit's hair	10.50	»	»	18.50
Cloth refuse	3.64	»	»	5 50
Wool refuse	4.65	»	»	13.00
Pigeon's dung	1.45	1.40	»	5.00
Bone ash	»	1.70	3.10	»
Phosphate of degelatinised bones	»	1 10	»	»
Degelatinised bones	»	33.90	»	13.00
Residuary bone-black	»	2.05	»	»
Night-soil cakes (1)	0.37	0.27	1,50	»
Sewer water	0.92	»	»	»
Silk-worm chrysalides	8.00	»	»	18.00
Sardine débris (Sample No. 1) (2)	2.71	4.02	0.18	10.00
do. (do. » 2)	5.18	7.00	»	»

Vegetable manures

Nature of Residue analysed	Nitrogen %	Phosphoric Acid %	Potash %	Price in frs. per 100 kg.
Tobacco manure, moist	0.73	0.59	0.62	»
» dry	1.31	1.08	1.15	»
Tobacco ash	»	»	6.47	»
Dry wine lees (3)	5.02	»	»	4.50
Moist do.	1.50	»	»	»
Grape pips (4)	1.40	»	0.17	»
Grape pips cake	1.75	»	0.2	»
Sugar mill refuse	0.20	2.20	0.03	1.25
Charcoal burners residues	0.28	0.54	0.34	»

(1) Human excreta, mixed with saw-dust used as absorbent.

(2) The first sample was analysed as it came from the fishery of Berre, the second after desiccation and the sulphide of carbon oil-extracting process.

(3) After extraction of tartaric acid.

(4) Containing 12 to 15 % of an oil that is used for soap-making. It is extracted by sulphide of carbon and grape-pip cakes are made.

France

Residues of oil works

Nature of Residue analysed	Nitrogen %	Phosphoric Acid %	Potash %	Price in frs. per 100 kg. %
Debris of horse hair mats used in oil pressing.	5.50	»	»	14.50
do. after sulphuring . . .	9.19	»	»	»
Cotton seed husks.	0.60	»	»	1.50
Damaged cotton meal	5.50	»	»	10.25
Pea nut earth.	1.65	»	»	»
Pea nut bran	1.90	0.42	0.35	»
Damaged pea nut cake	7.70	»	»	15.00
Castor oil cake	3.50	»	»	»

Other residues.

Nature of Residue analysed	Nitrogen %	Nitric acid %	Price in frs. per 100 kg
Residues of carbide of calcium works	0.70	»	»
Water from cleaning holds of nitrate ships	»	4.24	5.50

The greater part of these manures are easily assimilable.

2512 SOULE. **Fertilizing with Cotton Seed Meal.** — *The Tropical Agriculturist.* No. 5, pp. 439-440. Colombo, May 1911.

Ceylon

Cotton seed meal provides a most desirable form of organic nitrogen for farm crops. As regards the amount to use, that will depend on the crop, the soil and the grade of fertilizer desirable under a given set of conditions. Cotton seed meal also has the advantage of carrying from 2 to 2.5 per cent. of phosphoric acid and from 1 to 1.5 per cent potash. It is not a complete fertilizer in the sense of being balanced in the essential elements it provides for crop nutrition, but it can be easily improved through the use of acid phosphate and muriate of potash.

It has the great advantage of mixing with these materials without the slightest injury, since no objectionable chemical reactions occur.

Cotton seed meal could be most advantageously used as a source of organic nitrogen, as it supplies this element in a cheap and efficient form without danger of loss or injury to the soil; and if a

crop rotation has not been pursued, any additional nitrogen could be easily and cheaply applied through a top dressing with nitrate during the growing season.

Should it be desirable to prepare a fertilizer for very sandy lands which are deficient in potash, the cottonseed meal might be used, and to each 500 to 1 000 pounds applied per acre add 56 to 100 pounds of muriate of potash. The advantages of cottonseed meal as a source of organic nitrogen, and the ease with which it can be applied separately or mixed with other materials, are not as fully appreciated as they should be.

W. P. KELLEY. **The Assimilation of Nitrogen by Rice.** — *Hawaii Agric. Exp. Sta. Bul.* No. 24, p. 20. Washington, June 16, 1911. **2518**

Experiments reported in this bulletin show that in field trials the application of ammonium sulphate produced considerable increase in the yields of straw and grain of rice, while nitrate of soda was ineffective. The application of ammonium sulphate before planting, gave greater yields than were produced by application at intervals during the growth of the crop. **Hawaii**

Nitrate of soda produced little or no effect, however applied.

Soy-bean cake as an organic form of nitrogen produced considerable increase in the growth, while ammonium sulphate was the most effective of all forms applied. Ammonium sulphate not only increased the height of the rice, but also brought about greater tillering than nitrates, thus insuring a larger number of fruiting stems in a given area.

Denitrification was found to take place in paddy soils, thus resulting in the formation of nitrates, and possibly bringing about loss of nitrogen as free gas. Ammonia developed to a considerable extent during the time of irrigation, while the nitrates originally in the soil soon became reduced to a minimum.

The application of nitrates gave rise to a slight increase in the ammonia of the soil. The addition of soy-bean cake resulted in considerably increased ammonia formation, and still greater quantities of recoverable ammonia oocurred where ammonium sulphate was applied.

Sand cultures showed that, if rice has access to nitrates as the only source of combined nitrogen, unhealthy and stunted growth follows; while on the other hand, ammonium salts brought about vigorous growth.

In practice, the use of ammonium salts or organic nitrogen, and not nitrates, are recommended for rice culture.

The failure of rice to properly assimilate nitrates cannot be adequately explained on the basis of insufficient sugar content in the leaves, but may be due to a lack of nitrate-reducing enzyms, which, having long ceased to function through disuse, are no longer developed in sufficient quantities to enable the rice plant to fully satisfy its nitrogen requirements.

2514 J. Ray. **The Nitrogen Market of the World in 1910.** — *Journal d'Agriculture Pratique*, 75th Ann. Tome II, No. 31, p. 141. Paris, 3rd Août 1911.

The output of Chilian nitrate in 1910 was about 2 470 000 tons and the consumption reached 2 100 000 tons (1). The ammonia sulphate produced this year throughout the world is on the other hand estimated at 1 117 000 tons.

Chile

The curve showing the monthly quotations from 1903 to 1910 proves that the prices of sulphate fluctuated about a mean of 30 francs per 100 kilogrammes (2). Nitrate, which was priced at 23 fr. in 1903, rose to 28 fr. in 1906 and dropped again to 23 fr. in 1910. The average of these last eight years gives fr. 29.2 for sulphate and fr. 25 for nitrate. Thus, as a rule nitric nitrogen is about 10.5 % dearer than ammoniacal nitrogen; but in 1910 it became cheaper. There is in point of fact a difference of 7 to 10 centimes per kilogramme of nitrogen in favour of nitrate. In 1911 the divergence grew to be fr. 0.20 per unit of nitrogen.

2515 A. Winslow. **Chile Nitrate Industry in 1911.** — *The Engineering and Mining Journal*, Vol. 92, No. 11, p. 493. New York, 9 September, 1911.

The nitrate of soda year in Chile, which closed June 30, 1911, was fairly prosperous, according to Consul Alfred A. Winslow, the production reaching 54 297 531 Spanish quintals (of 101.42 lb. each) a gain of 2 237 277 quintals over the last nitrate year. During the year the price of nitrate on this coast advanced from $ 1.64. United States gold per Spanish quintal for July, 1910, to $ 1.84 per quintal for July, 1911.

Chile

During the nitrate year, three new nitrate works opened for business, making 158 ready for work on June 30, 1911, and others

(1) See this *Bulletin* for March 1911, Abstract 767. (*Ed.*).

(2) 1 kg. = 2.2046 lbs.

re under construction, with a view of bringing the production up o at least 55 500 000 Spanish quintals during the present nitrate ear. During the last nitrate year the United States greatly increased the imports of nitrate from Chile, and it seems from present indications that the year to come will be another record breaker.

The Production of Nitrogenous Artificial Manures in Iceland, Sweden and Norway. See above, Abstr. 2490. 2516 Ireland. Sweden. Norway

L. Vuaflart. **Crude Ammoniac and Cyanamide in Connection with the Recent Decree on the Repression of Fraud in the Fertilizer Trade.** — *Bulletin International de la Repression des Fraudes*, IVe année, No. 33, pp. 225-226. Paris, Juillet. 2517

The Decree of May 3, 1911 which in France (1) regulates the application of the law dated February 4, 1888 on the repression of fraud in the fertilizer trade, contemplates only three kinds of nitrogen; nitric, ammmoniacal and organic. According to M. Vuaflard crude ammoniac and cyanamide have no place in this classification. In fact the nitrogen contained in crude ammoniac is to a certain extent in the form of cyanides and sulphocyanides. Under the name of organic nitrogen the trade designates the nitrogen derived from organised matter. As for cyanamide it contains neither ammoniacal, nor nitric, nor organic nitrogen. Its nitrogen becomes ammoniacal only after the transformations it undergoes in the soil or under the action of dampness. France

M. Vuaflard therefore proposes a fourth class: chemical nitrogen, which would comprise crude ammoniac, cyanamide and the new synthetic fertilisers which may hereafter be produced, as for instance, nitride of aluminium which has been recently proposed as a fertilizer.

Preparation of Calcium Cyanamide and its Uses as a Manurial Agent. — *Bulletin of the Imperial Institute*, Vol. I, No. 1, pp. 44-51 and No. 2, pp. 123-134, London, 1911. 2518

This article gives an account of the manufacture of calcium-cyanamide, and general information as to its use as a manure and

(1) See Abstr. 2097 *Bull.* July 1911. (*Ed*).

a summary of the information available regarding the results of field trials of cyanamide with the following crops: Wheat, barley, oats, maize, rice, potatoes, turnips, sugar beet, grasses, sugar cane, hemp, flax, cotton, tobacco, hops, grape vines, olives, onions.

The following list of works now in operation, or under construction, and their estimated annual output, serve to indicate the rapid growth of the calcium-cyanamide industry. Those now in operation are:

	Annual capacity Tons
Piano d'Orta, Abruzzi, Italy	5 000
Westeregeln, Germany	5 000
Odda, Norway	12 000
Knapsack	5 000
Bromberg, Germany	3 000
Martigny, France	3 750
Notre Dame de Briançon	3 750
Ontario, Canada	5 000
Kinru	4 000
Terni, Italy	4 000
Sebenico, Dalmatia	4 000
Total	54 400

The works to be completed in 1911, include those at Trosberg (12 500 tons). at St. Marcel (3 000 tons), at Almissa (4 000 tons) and at Marblerocks near Nerbudda, Central Provinces, India (4 000 tons).

In order to avoid trouble from the dustiness of cyanamide, a small quantity of shale oil is now added before the product leaves the works. This addition is stated to cause agglomeration of the finer particles without interfering with the efficacy of the manure when applied to soil (1).

From the results of field trials of cyanamide as a manure, the following general conclusions are drawn:

Calcium cyanamide can either be harrowed in or applied as a top dressing, but in most cases the former method gives the better result. The quantity applied should be between 25 and 45 lb. of nitrogen per acre (between 28 and 50.4 kgs. per hectare) or 2 to 6 cwt. of cyanamide containing 20 per cent. nitrogen (about 125 to 250 kgs. per hectare). It appears to be advisable to apply the manure when the soil is wet, or when there is a prospect of rain.

(1) See Abstr. No. 72, *Bulletin* for January 1911.

As a general rule it may be stated that the manurial value of calcium cyanamide is about equal to that of sulphate of ammonia when the culture is carried out on a fairly good soil, but is inferior on poor moorland or sandy soil. The beneficial effects of its application are more noticeable when applied to crops which especially need nitrogen for their successful cultivation; but on soils requiring lime as well as nitrogen, calcium cyanamide is likely to give a better return than sulphate of ammonia or nitrate of soda, especially during the second season, when the effect of this lime is more noticeable than during the season of application.

Phosphates in Tonking. — *Bulletin de l'Office du Gouvernement général de l'Algérie*, No. 11, p. 169, Paris, 1 Juin 1911. **2519**

In the space of a few weeks Mr. Dureigne assured himself of the existence of phosphate deposits in the provinces of Lang-Fou, Thai Nguyèn, Ninh-Binh, Tuah-Hoa, Vinh, Hai-Duong etc. **Indo-China: Tonking**

Some samples weighing 4 to 10 kilos (8.81 to 22.04 lbs.) have given up to 82 % of tricalcium phosphate. Blocks collected in different localities have been found to contain from 48 to 60 per cent of tricalciumphosphate.

M. L. Pervinquière. **Phosphate Beds in the United States** (Les ressources minérales des Etats Unis) - *Revue scientifique*, 49e Année, No. 12, pp. 367-368, Paris, 16 Septembre, 1911 (1). **2520**

Annual output. The phosphate industry began in the United States in 1867 ; Florida, South Carolina, and Tennessee were the only phosphate producing states at first, then North Carolina, Alabama and Pennsylvania contributed their share, but their phosphate beds are now exhausted. In 1900, phosphates were discovered in Arkansas, and in 1907 in Wyoming, Idaho, and Utah. From 1867 to 1907 the United States produced 29,208,141 tons of phosphates, valued at 586,580,000 francs. (£. 23.463.200). **United States**

Deposits in Florida. — Phosphates are found along the west coast ; they belong to the Tertiary period. There are three kinds : hard rock phosphates (78 to 80 % of tricalcic phosphate), land-gravel phosphates and river gravel phosphates, (from 68 to 70 % of phosphate). Rock

(1) See this *Bulletin* : Feb. 1911, Abstr. 416; March, 1911, Abstr. 777; July, 1911, Abstr. 2094.

phosphates belong to the Eocene and Miocene ages; those belonging to the former period consist exclusively of nodules enclosed in a matrix of phosphatic sand and clay, those dating from the Miocene consist also of stratified deposits. The nodules vary from 5 centimetres to 3 metres in circumference ; they are found in all positions, sunk in sand and clay containing more or less phosphate. The land-gravel (galet de terre) consists of pebbles which vary in size from a pin's head to a nut ; it is white, but turns black in water ; it is surrounded by sand and rests on a bed of hard clayey substances. The gravel is covered by a deposit from 1 to 25 feet thick of nodules, consisting of sand and lime. The proportion of phosphates to foreign matter varies from 10 to 25 %.

The river-gravel (galet de rivière) occurs in the river-beds and much resembles the *galet de terre.*

The phosphate industry began in Florida in 1887, with an output of 3,000 tons. In 1907 the output had risen to 1 357 365 tons, or 60 % of the total output of the United States. It is reckoned that some 15 000 000 tons still remain ; and, at the rate at which they are now being used up, the deposits will be workable for another 12 years.

Deposits in South Carolina. Phosphates are only found here as land and river gravel, containing from 55 to 58 % of tricalcic phosphates. They belong to the Miocene period.

The deposits were first worked in 1867, with an output of 7 tons ; in 1889 the highest output was obtained (541 645 tons); since then the yield has declined. In 1907 it amounted to 257 221 tons. The reserve does not exceed 3 000 000 tons and will be exhausted in 15 years' time.

Deposits in Tennessee. — There are three kinds of phosphates ; brown residuary phosphates (70 to 80 % of phosphate of lime), blue or black phosphates (same content), and white phosphates (75 to 85 % of phosphate) ; some samples contain as much as 90 %. The first belong to the Ordovician age, and are due to the washings to which the phosphated lime has been subjected ; the depth of the deposits varies from 2 to 8 feet. Blue and black phosphates are of the Devonian age, and present all variations between an agglomerate of compact oolitic structure and a schistose type.

There is also a nodular variety with a high phosphate content (60 %) which can rarely be used owing to the hardness of the matrix. White phosphates are post-Tertiary ; they are found in three forms, stony, fragmentary, and lamellate. The first is not made use of at present ; the second consists of fragments of carboniferous basanite; cemented by phosphate of lime ; the third consists of parallel lamellae

about 2 centimetres thick, bnt over 10 centimetres in length and breadth.

These dep sits were first worked in 1893, with an output of 19 000 tons; and in 1907 the output amounted to 638 612 tons. Allowing that when the deposits of Florida and Carolina are exhusted, Tennessee will supply the worlds' demand, the reserve will hold out till 1960; at the present rate of extraction the deposits would last for 160 years, as the reserve is estimated at 103 500 000 tons.

Deposits in Wyoming, Idaho, and Utah. — The phosphate beds in these States are found between layers of upper carboniferous schists and lime-stone, sometimes 100 feet thick. The layers of phosphates vary in depth from a few centimetres to 3 metres. At the base of the series is a bed of lime-stone, then a schistous layer from 14 to 15 centimetres thick, after which comes the first stratum of phosphates, from 5 to 6 feet thick; these phosphates are oolitic and rich in acid: Several such strata of phosphates alternate with thin layers of lime-stone and schist. One or two of these strata are exploited. The proportion of phosphate of lime varies from 65 to 80 % with an average of 72 %. These beds have only begun to be worked; they must contain about 100 000 000 tons, which would allow of their supplying the whole demand of the United States for 44 years.

Deposits in Arkansas. — The rock is light gray, and homogeneous with small, more or less angular pebbles; the phosphate content varies from 25 to 73 %. The deposits were first worked in 1900, with an interval to allow of plant being installed; and have only just begun to be worked again. Arkansas cannot be considered as an important source of supply.

Duration of the reserve. — For the past 20 years, the output of phosphates has increased at the rate of 117 % in a decade; under these conditions the available phosphate deposits would be exhausted in 25 years, and in 1932 the output would be 17 million tons. But it must not be forgotten that hitherto only rich phosphate deposits have been worked, and that necessity will lead to be the working of the poor ones containing from 30 to 50 % of phosphates, of which the tonnage is enormous.

Nearly one million tons, or 40 % of the national output, are exported. The new lands which are being brought under cultivation from day to day will increase the demand for phosphates; which at this rate, in 25 years' time, will be triple what it was in 1907.

It is true that it will be possible to economise this fertilizer by using the sewage waters of towns and by obtaining the phosphoric acid from human excrement, which would supply the equivalent of

1 200 000 tons of phosphates per year, *i. e.* half the present output of the United States. But in spite of this, improved methods of working the deposits have become necessary; the exploitation of the latter should be regulated, and they should be let on lease so as to allow of effective supervision.

2521 **Phosphate Beds.** (Gisement de phosphates). — *Revue scientifique*, 49e année, 2e sem., No. 10, pp. 305-306. Paris, 2 Septembre, 1911.

Tunis

New phosphatic deposits af considerable importance are said to have been discovered at Kalaa Djerda in Tunis.

2522 **Algerian and Tunisian Phosphate.** — *The Engineering and Mining Journal*, Vol. 92, No. 5, p. 213. New York, July 29, 1911.

Phosphate to the amount of 319 690 tons was shipped from Algeria during 1910, making the total shipment of that product 4 575 515 tons from 1894 to 1910, inclusive.

Algeria. Tunis

The shipments from Tunis for 1910 were 1 286 262 tons, making a total of 7 512 723 (1894-1910).

2523 **A Chemical Solution of the Potash Problem.** — *Scientific American*, Vol. CV. No. 7, p. 136. New York. August 12, 1911.

United States

By heating finely ground feldspar with calcium chloride (cheap by-product of soda-making) and some lime-stone, the potassium can be extracted as the soluble potassium chloride. The residue is suitable material to calcine further into cement. The cost at present is much too high, but it would be reduced by the sale of the cement. One ton of feldspar yields 86 kg. (190 lbs.) of potassium chloride worth 23.35 fr. (18 *s* 5 ½ *d*), and five or six barrels of cement worth as much more.

The experts of the Tariff Board urge the appointment of a national commission of chemists, geologists, engineers and business men to study the problem on a scientific and economic basis. The questions of the localities in which the raw material is found and of its transportation are of the highest importance.

Potassic Fertilizers in France. — *Revue Scientifique*, 49e Année; 2e Sem. p. 151. Paris, 29 Juillet 1911. 2524

The Potash Syndicate of Stassfurt is the almost exclusive purveyor of potassic fertilizers. Consequently its statistics are of the highest importance from the point of view of agricultural improvement.

The quantities of pure potash (K^2O) contained in the fertilizers consumed by the various districts of France are given in the following table. The figures are in English pounds per cultivated square mile. France

	In 1900	In 1909	Difference
North	365	1 319	+ 954
Lorraine	166	566	+ 400
Normandy	97	268	+ 171
Brittany	23	68	+ 45
Touraine	51	154	+ 103
Burgundy	46	97	+ 51
Ile de France	851	1 473	+ 622
Poitou	57	74	+ 17
Garonne	200	194	— 6
South West	11	57	+ 46
Central Plateau	11	11	0
Languedoc	411	342	— 69
Provence	257	497	+ 240
Lyonnais	80	147	+ 63

The increase of consumption of potassic fertilizers in the North of France coincides with the general progress in agriculture.

The diminution noticed in Languedoc and Garonne is chiefly due to the crisis in the wine trade.

Provence on the other hand, owing to the constant extension of its market- gardening, uses great quantities of chemical fertilizers, which together with the favourable climate allow exceedingly heavy crops to be harvested (1).

The consumption of potash in France has doubled in 10 years having risen from 8 130 tons to 17 662 tons.

Salts of Potash as Fertilizers for Hops. — See below, Abstr. 2635. 2525

(1) See below, Abstr. 2652. (*Ed.*)

2526 D. Prianischnikow. **The Influence of Carbonates of Lime on the Fertilizing Action of several Phosphatic Manures.** (Über den Einfluss von Kohlensaurem Kalk auf die Wirkung von verschiedenen Phosphaten). — *Die Landw. Versuchs-Stationen*, Band LXXV, Heft V u. VI, pp. 357-376. Berlin, 1911.

Germany

The writer briefly summarises the results obtained in experiments in cultivation made in pots, with sand and nutritive substances, with a view to ascertaining the influence of carbonate of lime on the fertilizing action of several phosphatic manures.

As regards their value as fertilizers, phosphates of lime can be classified in two groups ; the first, namely those which are not very sensitive to the action of carbonate of lime, consists of mono- and bicalcic phosphates, and the phosphate of lime contained in basic slag ; the second group comprises tricalcic phosphates, bone phosphates and phosphorites, which are all affected by carbonate of lime, and depreciate as the result of its addition. The addition of lime has always given good results, when the nitrogen is derived not from nitric but from ammoniacal compounds.

Phosphates of iron and alumina do not suffer any depreciation by the addition of carbonate of lime and are themselves readily assimilated.

Water slowly decomposes them ; and for this reason they do not possess the importance which has been ascribed to them for the study of the secretions of plant-roots.

2527 **Liming Apparatus Needed**. — *Scientific American*, Vol. CV, No. 9, p. 194. New York, August 26, 1911.

United States

In many localities the soil is limed at intervals, and it is very common to see piles of lime spaced apart throughout the fields. The former practice in liming the soil was to apply large amounts (1 to 3 tons per acre) at long intervals: Investigation has shown, however, that, as a rule, it is better practice to apply smaller amounts (500 to 1 000 pounds per acre) at shorter intervals. One difficulty in the way of a general adoption of the latter practice has been the lack of an implement that will evenly distribute such small applications of lime. It ought not to be difficult to devise such a distributing machine, and there is no doubt that an efficient imple-

ment for this purpose would aid greatly in promoting this useful agricultural practice (1).

Increasing Use of Fertilizers in the United States. — *California Cultivator.* Vol. XXXVI, No. 24, pp. 708-709. Los Angeles, June 15, 1911. 2528

The total value of the fertilizers imported in the United States aggregated 40 000 000 dollars in the calendar year 1910, against 10 500 000 in 1900 and 5 500 000 in 1890, according to figures compiled by the *Bureau of Statistics of the Department of Commerce and Labour.* United States

The production of phosphate rock has increased, according to reports of the *Geological Survey* from 6 500 000 dollars in 1904 to 10 750 000 dollars in 1909; while the *Census Office* reports the value of fertilizers manufactured in 1890 at 39 000 000 dollars, in 1900 at 45 000 000 and, in 1905 at 57 000 000.

The total production in 1910 was probably 70 000 000 dollars which added to the fertilizers imported give a total value of 110 000 000 dollars. Meantime the United States exported last year fertilizers to the value of 10 000 000 dollars, making the approximate consumption of soil foods by the farmers of the country about 100 000 000 dollars per annum, omitting consideration, in this connection, of cottonseed meal, used in part as fertilizer material.

Imports of soda nitrate have increased from 3 000 000 dollars in 1890 to 5 000 000 in 1900, and to over 16 500 000 in 1910 (2). The imports of potash salts of the fertilizer class have increased from 1 000 000 dollars in 1890 to 2 000 000 in 1900, and 6 2/3 millions in 1910; while imports of phosphates, guano, kainit and other fertilizers have increased from over 1 000 000 dollars in 1890 to 2 000 000 in 1900, and 9 500 000 in 1910.

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(1) The proper liming of the soil is of great importance as a means of improving it. This is particularly true for lands situated on the coast, where the sea winds accumulate a considerable amount of chloride of sodium; this salt is the cause of the impoverishment of the soil in carbonate of lime. In Italy, for instance, there are many districts where the soil has been found to contain little lime, but quantities of sodium chloride accumulated by the rain. This subject has been studied at Perugia by G. Bellucci. Contribuzione allo studio delle acque meteoriche. *Le stazioni sperimentali agrarie italiane.* Volume XIV, 1888, pp. 255-258 (*Ed.*).

(2) See above, Abstr. No. 2515.

The number of establishments devoted to artificial fertilizers has increased from 278 in 1880 to 553 in 1905 ; the tons of material used, from 727 453 to 3 591 771; and the value of their product, from 20 000 000 dollars in 1880 to 57 000 000 in 1905. The materials used by the domestic fertilizer industry in 1905 included bones, tankage, etc., 5 000 000 dollars ; phosphate rock 4 500 000 ; potash salts, 3 500 000; superphosphates 3 000 000 ; cotton seed meal, 2 ⅓ millions; pyrites, 2 000 000 ; kainit nearly 2 000 00; nitrate of soda 1 750 000 ; sulphuric acid 1 000 000 ; fish guano nearly 1 000 000 ; ammonia sulphate a little over a half million; and various other articles, such as sulphur, lime, wood ashes, and salt.

2529 **Dynamite Used in Tilling Land** (1). — *The Gardeners' Chronicle*, vol. L, No. 3686, p. 131. London, August, 1911.

According to the *Pastoralists' Review*, dynamite has been used in place of the plough for tilling clay land in Kansas. Experiments were conducted on an acre field, holes being made by crowbars to a depth of 4 feet, in rows 3 feet apart, and cartridges of dynamite were inserted, these being exploded by a line of men provided with red hot irons.

United States: Kansas

The explosions threw clouds of soil 30 feet into the air, and covered the men from head to foot with dust and dirt. The method is recommended for clay soils that have not been previously disturbed.

2530 C. V. SEELHORST. **Influence of Soil Moisture on the Succession of Crops.** — See above, Abstr 2454.

3531 A. MORETTINI. **Effect of Sulphide of Carbon on the Germination of Wheat.** (Azione del solfuro di carbonio sulla germinabilità del frumento). — *Le Stazioni sperimentali agrarie italiane:* Vol. XLIV, fasc. 5-6, pp. 417-422. Modena, 1911.

Italy

When wheat is stored in granaries, it is subject to the attacks of various insects, of which some are brought with the harvest from the fields, and the rest are found in the granaries. The most fre-

(1) See the experiments of CORNELIO GUERCI: Nuovi esperimenti nel dissodamento dei terreni col mezzo della dinamite, *Annali della R. Accad. di Agricoltura di Torino.* Vol. XIII. p. 57. Torino 1880.

(*Ed.*).

quently met with, and the most injurious are: *Butalis cerealella*, *Tinea granella*, and *Calandra granaria*.

Among the several preventive measures recommended for the control of these insects, sulphide of carbon has been much used, of late years, on account of its recognised value. But a number of people fear that this insectide has an injurious effect on the germination of seed wheat.

Mr. Morettini has therefore thought that it would be useful to ascertain, by means of experiment, up to what limit sulphide of carbon may be used without injury to the germinative capacity of wheat.

The experiments were made at the Royal Agricultural Institute of Perugia, from January to the end of April 1911, on "Passerini's Hybrid" (a cross between "gentil rosso" and "Noe") a soft wheat, and on "Fucense" a hard wheat.

The experiments led to the following conclusions:

1) Sulphide of carbon, used in sufficient quantities to control granary insects, that is, 35 grammes per hectolitre (about ½ oz. per bushel) at each treatment, has no injurious action on the germination of wheat; it may therefore be advantageously used even on seed wheat.

2) When however an excessive quantity of sulphide of carbon is employed, or when it is improperly applied, even in moderate quantities—for instance, if the action of the sulphide vapours be concentrated for a considerable length of time on only one part of the heap of wheat (which invariably happens if the insecticide be poured directly into the heap by means of a funnel, instead of placing it in open vessels, covered with a cloth, situated in the upper parts of the heap)—then the germination of the wheat may be impaired.

JEAN APSIT and EDMOND GAIN. **Experiments with Seeds under the Influence of Anaesthetics.** (Les Grains en état d'anesthésie). — *C. R. des Séances de la Société de Biologie*, Tome LXX, No. 24, pp. 55-58. Paris, 7 Juillet 1911. 2532

These reports deal with the sensibility of anaesthetized grain to the action of heat and its gradual return to a normal condition.

The preliminary experiments show that the germination of grain containing 12 % of water which had been steeped for 24 hours in ether, was normal, whereas grain containing 21 % of water was killed after remaining from 30 to 40 minutes in liquid ether. (1). France

(1) Cf. the experiments of ITALO GIGLIOLI on the resistance of grain to the action of liquid and gaseous reagents, in 1878, 1882, and 1904. Grains of

Moisture is thus seen to be an essential factor in the toxic qualities of anaesthesia.

When other conditions are equal, wheat is much more sensitive to heat when anaesthetized than when normal.

As the state of anaesthesia disappears, the sensitivness of the grain to the action of heat progressively declines, and it returns to its normal state.

The duration and relative intensity of the anaesthesia of grain can be determined by this special sensitiveness.

The action of heat would seem to indicate that the toxic action of anaesthesia is merely strengthened by raising the temperature.

2533 G. LAKON. **Germination of Seeds of the Ash Tree (Fraxinus excelsier L. etc)** (Beiträge zur forstlichen Samenkunde. II Zur Anatomie u. Keimungsphysiologie der Eschensamen *Mitteil. aus dem Bot. Institut der Kgl. Forstakad. zu Tharandt*). — *Naturwissensch. Zeitschr. für Forst- und Landw.* 9 J., 7 H., pp. 285-298+ figs. 5 Stuttgart, Juli 1911.

Germany

The Author studies from a micro- and macro-chemical point of view the composition of the seeds of *Fraxinus excelsior* L. and their germinative power.

The principal consclusion is that the seeds of the common ash tree do not really germinate late, but that their embryo pregerminates within the seed, so as to be protected during the winter.

Fraxinus americana L. on the contrary germinat es normally.

2534 **The Germination of Maté Seeds.** See below, Abstract. 2626.

2535 **Production of Clover Seed; Loaning of Threshing machines.** See below, Abstr. 2942.

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lucerne were placed in boiling ether for 160 hours, and 31 % of them retained their vitality. In boiling carbon disulphide (CS_2) after eight hours the percentage of vitality was 75. In the aqueous alcoholic solutions it decreased in inverse proportion to the water content.

See: *Gazzetta Chimica italiana*, 1879; *Nature*, Vol. XXV, p. 328. *Naturforscher*, 1882, p. 220. *Atti del Congresso di Chimica applicata*, Roma, 1906.

Seed Control Legislation in Canada. 2536

In Canada the sale of all kinds of seeds for the purpose of seeding is regulated by a Federal law. Legislative restrictions in respect to the sale of seeds has been in force only six years, but during that time much improvement has been brought about in the trade. In 1902 an investigation into the condition of the seed trade was conducted which showed that timothy, (1) red clover (2) and alsike (3) seed badly contaminated with noxious weeds were being sold. A large proportion of the best and cleanest clover seed was exported and the inferior seeds were retailed in the home market. Canada

When the results of the investigation were published, demands were made by agricultural societies and individual farmers for legislation to restrict the sale of seed containing noxious weed seeds.

During the session of 1903 a bill was introduced into Parliament with a view to prohibit the sale of seeds of cereals, grasses, clovers and forage plants unless they were free from the seed of twelve specified weeds, and to provide for the uniform grading of timothy, red clover and alsike seed according to fixed standards of purity and vitality. This bill met with organized opposition from the seed merchants who contended that its enactment would unduly interfere with their business.

In order to meet some of the objections of the trade, a new bill was drafted and introduced during the session of 1904. It was passed in 1905 and came into effect on the first day of September of that year. This Act, cited as the Seed Control Act, provided that all seeds of cereals, grasses, clovers and forage plants must be free from the seeds of fourteen specified weeds, or be plainly labelled with the name or names of the weed seeds contained therein. A special classification was made for timothy, red clover and alsike seed which provided that when these seeds are graded N° 1, otherwise represented to be first quality, they must be free from the seeds of 23 specified weeds and contain, out of 100 seeds, not less than 99 of the kind or kinds represented, and be capable of germinating at least 90 %. Seeds not coming up to this standard but containing not more than five seeds of the specified weeds per 100 of the good seed may be sold if not represented as N° 1 or first quality seed. Under this Act a margin of tolerance was al-

(1) Phleum pratense.
(2) Trifolium incarnatum.
(3) Trifolium hybridum. (*Ed.*).

lowed, providing that cereals and seeds of like size should be considered free from the seeds of the weeds named in the Act, if they contained not more than one per pound, and the smaller seeds would be considered free if they contained not more than one per 150 of the good seed. By virtue of this Act, the Seed Commissioner was appointed official seed analyst and six permanent district officers were made official seed inspectors. Since 1905 the number of inspectors has been increased by the employment of temporary inspectors during the busy season of the trade.

This Act stood without change until 1910, when an amendment was passed which provided that seeds of cereals, grasses. clovers, field roots and garden vegetables that would not germinate in the proportion of at least two-thirds of the percentage standard vitality for good seed of the kind, as fixed by the Governor in Council, could not be sold, unless every bag or package containing such seed was plainly labelled with the percentage of seeds capable of germination. The amendment also added three weeds to the 23 already named in the Act and included alfalfa seed in the classification provided for timothy, red clover and alsike. The margin of tolerance allowed for No. 1 timothy and clover seed was changed to five per ounce in timothy. red clover and alfalfa seed, and ten per ounce in alsike seed.

After the Seed Control Act of 1905 had been in force a few years, a strong demand from farmers and retail seedsmen arose for uniform grading according to fixed standards of quality for timothy, red clover, alsike and alfalfa seed. In May, 1911, a bill was passed providing for enforced grading of these seeds according to fixed standards of quality as follows:

a) "Extra N° 1". — Pure as to kind, clean, sound, plump, of good color, free from the seeds of any noxious weeds, and containing not more than 30 seeds of any useless or harmful plant per ounce.

b) "N° 1" — Clean, sound. reasonably plump, of good color, containing not more than five noxious weed seeds per ounce of timothy, red clover or alfalfa, or ten per ounce of alsike seed. and not more than 100 seeds of all kinds of weeds including other useless or harmful plants per ounce.

c) "N° 2" — Reasonably clean, sound, containing not more than 20 noxious weed seeds per ounce of timothy, clover or alfalfa or 40 per ounce of alsike seed, and not more than 200 seeds of all kinds of weeds including other useless or harmful plants per ounce.

d) "Nº 3" — Containing not more than 80 seeds of noxious weeds per ounce of timothy, red clover or alfalfa, or 160 per ounce of alsike seed, and not more than 400 seeds of all kinds of weeds including other useless or harmful plants per ounce.

Under this Act farmers are exempt from the necessity of grading timothy, alsike, red clover and alfalfa seed according to the fixed standards of quality when the seed is grown, sold and delivered by them on their own farms; but they are not allowed to sell any of these seeds for seeding purposes if they do not at least come up to Nº 3 standard.

Farmers are also exempt from the necessity of labelling seed with the names of the noxious weeds contained when it is grown, sold and delivered on their own farms.

With these two exceptions, the Act applies to farmers throughout. When acting as agents, selling seed not grown by themselves, or selling their own seed elsewhere than on their own premises where it is grown, they are on the same basis as seedsmen.

Since the Act has been in force, a thorough system of inspection has been followed and numerous prosecutions for violations of the Act have been made. This has resulted in a marked improvement, especially in the wholesale trade.

During the past two years there have been few violations of the Act through seed supplied by wholesale dealers who clean seed, most of the violations being confined to the seed producing areas where local merchants secure their stocks direct from farmers.

The Seed Control Act does not deal in any way with the destruction of weeds growing along roadsides, in waste places or in cultivated fields. This comes within the jurisdiction of provincial governments and local municipalities, and different regulations prevail in the various provinces.

Field Crops. — Industrial Crops. — Horticulture Arboriculture.

2537 **Canada's Wheat Production. Rapid Development.** *The Times* (Commerce, Finance and Shipping). No. 39625. London, June 30, 1911.

Canada

In the Canadian West there are 357 000 000 acres of land known to be capable of producing wheat and other cereals. The acreage under cultivation has therefore increased rapidly, but comparison should be made with the land still to be cultivated, nearly 330 000 000 acres. Notwithstanding this small area of cultivated wheat land, in comparaison with the possible whole, the wheat crop of the Canadian West is admitted to be one of the leading factors in the world's markets for breadstuffs.

The increase in production bids fair to be more rapid in the coming five years than it has been in the past, on account of the extensive use of agricultural tractors. During the spring of 1911 tractors representing over 14 000 horsepower were shipped from Winnipeg to prairie farms. The average gasoline tractor can break from 30 to 37 acres of virgin prairie soil per day. One of these tractors can plough stubble land at an average rate of 50 acre a day.

The use of tractors has made possible the cultivation of the large farm. That is, the farm running from 12 000 to 60 000 acres.

The value of the wheat crop five years ago was $ 61 711 299 (1); for 1910 it was approximately $ 91 350 000.

Five years ago it required 47 000 cars to move the wheat; this year it is estimated that 145 000 will be required.

There are 1870 elevators in the prairie provinces, with a total storage capacity of 59 227 300 bushels.

Canada has absolutely the best system of grain inspection in the world.

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(1) $ 4.86 2/m = £ 1. (*Ed*).

G. M. Delgado do Carvalho. **Wheat in Rio Grande do Sul**. (O trio e sua historica. Plantaçoes actuaes no Rio Grande do Sul). *A Evoluçao Agricola*, An II, No. 23. pp. 16-19. Sao Paulo. Abril 1911. 2538

About the beginning of the XIXth century, the State of Rio Grande do Sul was an important wheat growing centre. Its production was sufficient not only for the demands of Brazil and La Plata, but for a considerable exportation to Cuba and to Portugal. In 1816 the crop amounted to 140 227 hectolitres (385 624 bushels). **Brazil: Rio Grande do Sul**

The first attacks of rust appeared in 1814. Then the disease spread, and to such an extent, that the growing of wheat diminished, and by 1823 had almost completely ceased. The Imperial government tried to revive it,—by means of the Decrees of 1857 and 1860 which awarded prizes to the producers of wheat,— but without any practical result.

The Federal Government repeated the attempts, and the State of Rio Grande do Sul, most of all, interested itself in the question. Whilst the importation of wheat into Brazil is continually increasing (from 23 450 contos of reis in 1900 it rose to 29 644 contos in 1908), in Rio Grande do Sul it is constantly decreasing. From 6299 contos in 1906 it sank to 4882 contos in 1908.

The growing of wheat has received much encouragement from the Decree of the 31st December 1908. The Federal Government grants a yearly subvention of 15 contos of reis (1) for five years to any syndicate or co-operative association that sows to wheat upwards of 200 hectares (about 500 acres). The same subsidy is granted to any landowner who erects a water or steam mill, or who mills at least 4000 hectolitres (11 000 bushels) of wheat harvested from his property. The grant reaches 20 contos a year for five years, if at least five syndicates unite to found experimental fields or laboratories for the study of chemical, physical or meteorological problems bearing on the raising of wheat ; all machinery and implements to be used for this object, by the above bodies, may be imported duty free. The co-operative societies have besides a right of preference in the sale by tender of their produce. They must, when re-

(1) The Brazilian milreis, of 1000 reis, is worth 2*s* 2.934*d*. In Portugal the milreis is worth 4*s* 5*d*. Large sums are expressed in " contos ", one conto being equal to 1000 milreis. (*The Statesman's Yearbook for 1911*, p. 668 and p. 1119). (*Ed.*).

ceiving grants, present detailed reports of their work to the Ministry of Agriculture ; they must also allow farmers free entrance to their fields and laboratories, and must furnish them with all the information they may require.

The raising of wheat is now carried out in upwards of 30 communes of the State of Rio Grande do Sul. The writer calculates the average yield in that State to be about 10 hectolitres per hectare (11.1 bush. per acre) on an area (in 1909) of not less than 21 700 hectares (53 600 acres).

2539 AL. ZAHARIA. **Roumanian Wheat. Answer to Prof. Th. Kosutany, Followed by an Appendix Containing a Study on the Crops from 1900 to 1908.** 1 Vol. 175 pp. Bucarest, 1911.

Rumania

The following are some extracts from the above work, published by the Laboratory of Agricultural Chemistry of Bucarest. Wheat is the most important of all Roumanian products. During the two last quinquennial periods, the area under wheat was from 27.16 to 30.75 % of the whole cultivated area of the country. The total production of wheat during the last 10 years has averaged 25 million hectolitres (68 750 000 bushels). It has varied considerably from year to year owing to climatic conditions, so that the yield per hectare has ranged between the quinquennial averages of 9.1 to 15.9 hl. per ha. (10.1 to 17.6 bushels per acre)

The Wheat raised in Roumania is almost wholly of the *Triticum sativum* variety, bearded, yellow or red. The chief varieties: of the former are : the " Banat ", probably so called from the place of its origin; the spotted wheat " ballatel," a dark red grain spotted with golden yellow ; old wheat " gran batrau " and giant wheat " gran urias " recently introduced. Spring wheats are also grown, but rarely. Among these the chief are the Russian varieties : Ghirca, Sandomirca, and Gulca ; and often, in Dobruja, Arnaut Wheat, with red or black ears, belonging to the *Triticum durum* species.

From the analysis of 7976 samples of wheat, from different districts, made between the years 1900 and 1908 the following results were obtained :

The maximum weight per hectolitre, average of nine years, is given by the district of R'-Sarat, with 78.48 kg. (62.78 lb. per bushel). The minimum by the Mucel district, with 75.33 kg. (60.26 lb. per bushel) ; and the Tulcea district in Dobruja, with 73.62 (58.89 lbs per bushel).

The maximum proteid contents observed during the nine years under examination, is given by the district of Jassi, with 16.04 %.

The minimum by the Mehedintzi district, with 12.80 %. The 1908 harvest was quite exceptionally high in proteid contents. The results of the first analyses seemed so extraordinary that Mr. Zaharia thought them due to errors : The average of the Braila district attained 19.96 % (1). The percentage of grains richer in starch than the average varied from 7 % in Jassi up to 38 % in Mehedintzi.

The weight of the grains does not vary much from district to district : thus for Braila the weight of 1000 grains is 31.11 grams whilst for Muscel it is 36.88.

Fat contents range from 1.64 to 1.72.

The minimum of crude fibre, which corresponds to a maximum of proteids, was found in the districts of Botochami, Braila, Covurlui, etc.

The ash varies in the same ratio as the fibre. As for the water content, no account has been kept of it, as it varies according to the conditions under which the samples are stored.

Arnaut wheat raised in Dobruja presents different characters, both physical and chemical. Its weight per bushel is higher than that of any other wheat cultivated in the same district; the number of grains richer in starch than the average is reduced almost to nil; while the proteid content is very high.

Adopting, as coefficient of quality, the value given by the following formula : K = weight per hectolitre + 2. proteids, that is: the sum of the weight per hectolitre plus twice the figure of the proteid content, the writer finds that the districts showing the highest coefficients are those of Moldavia.

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(1) Average composition of wheat.

	Soft wheat	Hard wheat
Gluten / Albumen	12.44	15.9
Starch / Dextrin	67.40	57.6 / 6.7
Fat	1.31	1.5
Fibre	2.80	2.3
Ash	1.07	2.05
Water	14.—	14.—

See VERMOREL, *Aide mémoire de l' Ingénieur Agricole*, p. 429, Montpelier, 1906. According to DIETRICH and KÖNIG, *Zusammensetzung u. Verdaulichkeit der Futtermittel*, I Bd., p. 381, the maximum of proteid content, 24.16 % (with 10.10 % of water) has been found in a hard wheat from Eriwan (Caucasus). (*Ed.*).

A coloured map gives an idea of the divisions of the country according to the kind of wheat produced.

Some very interesting tables give the comparative figures showing the proportion of the cultivated area, the percentage of Tchernozion (black earth), of brown earth and of Podzol (sandy soils) the quality of the wheat according to the formula K, and the proteid content.

In another table the averages of rainfall in May and June are given, together with the weights per hectolitre, the proteid content and the values of K, and lastly the yearly and general averages of all the analytical results are tabulated according to the districts.

2540 N. BENDANDI. **Experiments on Eight Varieties of Wheat in the Province of Parma, Italy.** *L'Avvenire agricolo*, No. 8, pp. 318-321. Parma, 31 Agosto 1911.

In the Province of Parma eight varieties of wheat, of which four are Italian and four French, have been submitted to comparative experiments. Notwithstanding that the year was not very favourable for wheat, the results were relatively good; it may hence be concluded that all the varieties under examination have a certain general value.

Italy

The tillage of the soil and the manuring given were the same for each variety. The yield was the following:

	Quintals per Hectare
Cologna Veneta	21.37
Ibrido Inallettabile	23.55
Bon Fermier	20.38
Shireff's Cologna	23.35
Gros Bleu	20.72
Japhet	23.88
Gentile Rosso	21.—
Rieti	21.76

Shortly after sowing, the greatest development was shown by "Gentile Rosso" and "Rieti." "Bon Fermier" proved the latest. "Japhet" and "Bon Fermier" were slightly attacked by rust. "Rieti" and "Cologna" were lodged. "Cologna" was the earliest in maturing.

(1) 1 Quintal = 100 kgs. = 220.46 lbs.
1 Hectare = 2.4711 acres. (*Ed.*).

"Gentile Rosso" has again shown its superior qualities. It can yield heavy crops; it does not lodge, it stands climatic variations, and is rust resistant.

Further experiments, however, must be made, especially with "Japhet."

Testing Methods for Maize Breeding. — See above, Abstr. 2502 2541

R. W. THATCHER. G. A. OLSON and W. L. HADLOCK, **Wheat and Flour Investigations.** — *State of Washington Agricultural Experiment Station, Bulletin* No. 100. Pullmann, Washington, 1911. 2542

The first part of this Bulletin is a report of progress of the investigations of the chemical composition and milling quality of Washington wheats which were begun in the fall of 1905.

This report contains the results of the analyses and tests on the samples secured to represent the crops of 1908 and 1909. The average compositions of the crops of the entire five-year period are summarized and presented in the second part of this Bulletin, making a total of four hundred and thirty-one samples of wheat that were analyzed, milled and tested. United States: Washington

Of these, three hundred and forty-nine were samples representing the seven varieties which are most commonly grown in eastern Washington namely: Bluestem, Little club, Turkey red, Jones' winter Fife, Fortyfold, Red Allen and Red Russian. Thirteen samples of Macaroni or Durum wheat, and eight each of Sonora and White Amber were included in the list; while the remaining fifty-three samples were scattered among twenty other varieties which are grown in only small quantities or on comparatively limited areas, of which only one to four samples of each variety came in during the entire five years.

Included in these last twenty varieties were a few samples of the hybrid wheats which have been developed at the Washington Experiment Station and which have come into use in the past three years.

Discussing the influence of length of ripening period upon composition of wheat, the writers state that their observations led to the belief that variations are due to differences in the length of ripening period of the grain.

Most authorities are now fairly well agreed that the ripening of grain is merely a process of desiccation or « drying up ». Hence conditions favorable to rapid drying produce rapid ripening and

harder grain. The one climatic factor which would therefore have the chief influence in changing the composition or type of grain is that known as « evaporation-coefficient ».

Several factors or conditions cause changes in the rate of evaporation of water at any given time or place, such as temperature, relative humidity of the air, wind velocity, etc. but the combination of these is without doubt the influence which is the chief determining factor in the rapidity of ripening of the grain, and this, in turn, determines the " hardness " or type of wheat.

Unfortunately records are not available whereby this view can be confirmed by a comparison of the average " evaporation coefficient " in the different wheat-growing sections for the different seasons of the year, with the types of wheat of those sections. Such data are now being accumulated, however, and will be presented in later publications.

Variations in composition due to variety characteristics should not be overlooked in this connection. It is believed by the writers however, that these variety differences can be definitely correlated with the habits of each variety as to rapidity of ripening, and that these variations are due to the relative length of ripening period, as a variety characteristic and therefore, come under the same general rule as do all other observed variations in type or composition. Final conclusions on this matter must be suspended until sufficient data as to the ripening habits of the different varieties have been secured.

2543 H. Schulze-Besse. **The Spread of Different Varieties of Malt Barleys in the German Empire.** (1). (Die Verbreitung der Braugerstensorten im Deutschen Reiche. Auf Grund einer Umfrage des Propaganda Ausschusses für Gersten und Hopfenbau bei der Versuchs- und Lehranstalt für Brauerei in Berlin). — *Wochenschrift für Brauerei*, XXVIII Jahrgang, No. 32-35. Berlin, August und September 1911.

Germany

The writer sets out the results of an enquiry into the distribution of the different varieties of malt barleys in the German Empire. The agricultural Associations and Institutions of the Empire responded thoroughly to the appeal of the Propaganda Office of the Experimental Station and the Berlin Brewery School. The abundant material gathered in the 19 districts of the Empire, ac-

(1) In reference to malt barleys see page 49 of *Bulletin* November 1910 and Abstract 72 of *Bulletin* for June 1911. (*Ed.*).

cording to the division adopted by the Society of German Agriculturists, enables very interesting conclusions of a general character to be drawn. In the first place it is clear from these data that for several years past German agriculturists have shown a marked tendency to extend the cultivation of unselected native barleys (Landgersten), and particularly « Hanna » barley. This preference is presumed to be justified by the fact that these barleys yield satisfactory results in brewing, even from light soils; they posses greater powers of resistance than the « Chevalier » barley, both to drought and to lodging.

In the South of Germany, thanks chiefly to the efforts of the Bavarian Government, there is the probability that selected varieties of native barleys (Landgersten) will completely replace the other varieties. Even in the North, the selected varieties of " Rudolf Berth " as well as the selected " Hanna " barleys in Bohemia and Bavaria, are destined to find far wider cultivation, particularly where early harvest is desired from rather light soils. In moist, heavy soils, on the contrary, it will be in every way desirable to cultivate the " Imperial " varieties, among which " Goldthorpe " and " Webb's beardless " take the leading place. The reduction in the cultivation of the Chevalier varieties is general or nearly so. The chief reason of this lies in the low powers of resistance to lodging and the lower production in comparison with the " Landgersten ". These facts agree perfectly with those observed since 1854, at the permanent Barley and Hops Exhibitions in Berlin. A diagram shows the variations in the number of specimens of Imperial, Chevalier, and " Landgersten " barleys sent to these exhibitions between 1894 and 1910.

H. B. Derr. **Barley: Growing the Crop.** *U. S. Dept. of Agric., Farmer's Bull.* 443, p. 48. Washington, June 12, 1911. **2544**

Improved varieties of barley were first distributed in the United States about 1845. Among the most important introductions were the hooded types, including hull-less forms. In recent years a number of valuable varieties have been introduced by the Department of Agriculture from Europe. **United States**

The greater portion of the crop is produced in the States of Minnesota, California, Wisconsin, North Dakota and South Dakota.

The six-rowed barley is most widely grown in the United States. The best yielding varieties are Manchuria, Oderbrucker, Odessa, Gatami, and California. Among the best of the two-rowed varieties

may be mentianed Chevalier, Hannchen, Swan-neck, Kitzing, and Hanna. The hooded (beardless) and hull-less barleys yield well in the semi-arid and Rocky Mountain States. In the Southern and Central States the winter varieties are the most profitable ones to grow.

The usual rate of seeding in humid regions is 2 bushels; where the rainfall is slight, best results are obtained from the use of 4 to 6 pecks. Drilling gives better results than broadcast seeding. In the semi-arid regions harrowing after the plants come up is often beneficial. Much barley is grown under irrigation in the Inter-mountain States.

To obtain the best quality of grain, barley should be cut when in the hard-dough stage. Some growers prefer to cut when fully ripe. The grain should be shocked in oblong rather than in round shocks as the oblong shocks allow it to cure better. Where there are no high winds, the shocks should be capped. The grain is of much better colour and quality if the crop is stacked instead of being allowed to stand in the shock till thrashing time.

2545 O. NEUMANN. **Feeding Value of Oats.** (Einige Untersuchungen von Hafersorten verschiedener Provenienz auf ihren Futterwert. Mitteilung aus der Rohstoff- und Stickstoffabteilung der Versuchs- und Lehranstalt fur Brauerei, in Berlin). — *Wochenschrift für Brauerei*, XXVIII. J., No. 24, pp. 261-264. Berlin 17 Juni 1911 (Hafer Kontrolle). — *ibidem*, No. 25, pp. 279-281. Berlin, 24 Juni 1911.

Germany. Roumania. Russia

The writer after having analysed several specimens of German (14) and Roumanian (24) oats, concludes that in order to form a correct judgment of the quality of a description of oats the following points must be determined.

1. Sound and healthy appearance (smell, mustiness, poisonous foreign seeds and impurities).

2. Moisture, which should not exceed 15 %.

3. Weight of 1 000 dried seeds, which should not (for good qualities) be below 28-29 grammes.

4. The percentage of husks should not exceed 25-27 % of dried seed.

5. The albuminoids, which should not be less than 10 % or more than 13 %.

These conclusions, which mean, the need for determining the value of oats, are confirmed by director A. Förster (Haferkontrolle,

Allgemeine Zeitschrift für Bierbrauerei und Malzfabrikation, p. 69 sqq. 1911), who, in addition, determines the weight per hectolitre of German and Russian oats, the contents of cellulose, ash, fatty substances and non-nitrogenous extract.

He also proposes to determine the food value by means of the formula *albuminoid substances : fatty substances : non-nitrogenous extract* = 2 : 2 : 1, which however, Mr Neumann observes, no longer corresponds to the data given by Kellner.

E. Parke and B. Dyer. **Manuring of Oats and Mangolds.** — See above, Abstr. 2503. 2546

Yves Henry. **African Maize.** *L'Agriculture Pratique des Pays Chauds.* 11e Année, No. 98-99-100 ; pp. 370-386 ; 470-483 ; 46-57 ; Mai, Juin, Juillet 1911. 2547

In Dahomey the culture of maize has the advantage of two rainy seasons, the intensity and distribution of which determine good and bad harvests. This cultivation is carried on throughout the colony, but more particularly in the southern regions. Towards the north its place is taken by millet, as a food plant, owing to considerations of climatic adaptation. In the western part of the colony maize-growing is principally favoured in the districts of Athiémé and Bopa. **French West Africa: Dahomey**

The central part of Lower Dahomey, the districts of Allada and Abomey, have only taken part in this cultivation since 1908.

The natives generally choose the black soils in marshy, low-lying districts, the alluvial banks of streams and lagoons and the open spaces in medium and high forest and waste shrub lands, disregarding other formations for the present.

The varieties of maize cultivated in lower Dahomey are white, yellow and red maizes.

The white maizes comprise the early variety " Agado Komé ", the ordinary variety " Goékoun " and the late variety " Nioli ". The yellow maizes comprise the dark yellow maize " Gbaguen ", the early yellow " Quinto ", and the late " Khévet ". The Hounvé late red, and the " Sheep's eye " maize, used on the spot for the production of flour, complete the list of varieties cultivated in lower Dahomey. The white varieties are those chiefly used for exportation ; analysis, however, shows that they are all very much alike as to the yield of starchy substances and that facilities of cultivation

and trade must be the principal factors in the selection of one or other variety in the development of this cereal (1).

The white varieties may be used indiscriminately for all purposes; they command a somewhat higher price although they are more liable to the ravages of the weevil. The Hounvé red maize seemed lowest in point of resistance to insects.

The analyses of the Dahomey maize made by M. A. Houard in the Hann laboratory (2) are given below. The numbers in the analysis tables correspond to the following varieties:

1 Early white maize	Agogoda Komé
2 Late white maize	Nioli
3 Dark yellow maize	Gbaguen
4 Ordinary maize	Toga or Khévet
5 Early maize	Kinto
6 Red maize	Hounvé
7 Mixture of 2° and 3° called	Gboli

Constituent substances	1°	2°	3°	4°	5°	6°	7°
Water	13.8	13.6	14.0	13.6	14.0	14.2	14.2
Fat	4.5	5.0	5.2	4.6	4.4	4.2	5.0
Ash	1.4	1.5	1.5	1.7	1.3	1.5	1.5
Protein	9.8	11.0	9.4	10.6	9.8	9.8	10.3
Reducing substances	2.9	2.7	1.5	2.1	2.0	2.0	2.2
Starch	63.8	62.9	65.3	64.6	65.3	65.3	63.5
Crude Fibre	3.8	3.9	3.1	2.8	3.3	3.2	3.3

Generally maize is sown in Dahomey on yam fields, half broken up by the work of lifting; cotton plantation fallows, and earth-nut and haricot ridges are also sown with maize. The maize har-

(1) For maize in Rhodesia see: Abstract 1147, *Bulletin* for April 1911. (*Ed.*).

(2) KÖNIG gives the following figures for the average composition of maize: water 13.35, protein 9.45, fat 4.29, starchy substances 69.33, ash 1.29, reducing substances 2.29. See DIETRICH and KÖNIG *Zusammensetzung und Verdaulichkeit der Futtermittel* 1. Vol., p. 529, Berlin 1891. (*Ed.*).

vests occur at varying times according to the varieties grown and the times of sowing. Generally speaking it may be said that there is maize standing throughout the year and two principal harvests. Tests as to the yield gave results of relative value, but a comparison between the different varieties is of more general interest.

The results of these tests are recorded in the following table, which summarises the best conditions of soil, culture and variety for the maximum yield :

Nature of soil	Method of Cultivation		Yield in lbs. per acre	
Old forest soil (thalweg).	Ploughed	Sowing in rows	Agogodo Komé	3 356
			Khévet	3 082
			Niolì	3 068
		Native sowing	Niolì	2 758
Old forest soil (plateau).	Ploughed: Native sowing		Quinto	2 618
			Agogodo Komé	2 550
	Native method		Quinto	2 056
Shrub land fallow soil	Native method		Khévet	1 440

From the point of view of production per acre, the varieties are classified in the following order: Agogodo-Komé, Quinto, Khévet, Nioli.

These particulars, considering the limited number of tests, enable a fairly correct idea to be formed in the first place of the returns of land under maize. To do this, allowance must be made for the harvests of the short winter season, which are very far from equalling the yield of the first harvests. From observations made, the winter harvest may be taken as equal to $2/3$ of the yield of the greater harvest.

In the shrub-fallows the total annual yield would amount to about 2 070 lbs. per acre; on forest soils and black alluvial soils it

would be 3 330 lbs per acre: whence at the prices paid in 1908 (£2 4*s* per ton) the following returns per acre are obtained:

Forest soils	£3 6*s* 8*d*
Fallow soils	£8 18*s* 4*d*
Ordinary soils	£1 8*s* 4*d*
	to £1 13*s* 4*d*

The grain is stored by the natives either by leaving it in the ear and depositing it in a primitive granary made of branches and lined with palm leaves, or by picking the grain by hand and storing it in real silos.

The author follows up this study by enumerating local practices and examining some consequences of the development of this crop: economic competition with other crops such as palms, cacao and cotton; deforestation and the extension of palm plantations.

He concludes with some particulars of home and foreign trade and finally indicates the shortcomings of African Maize from a commercial standpoint. These defects are above all excessive moisture and liability to weevil (1).

Strictly speaking the worst fault in this maize is moisture, which brings about fermentation during transit by water and considerably reduces its value.

This moisture is due to the continuous rains and insufficient ripeness when harvested, exposure to rains between buying and shipping, and wetting while being loaded on board.

2548 **The Yield of Maize in Brewing.** — See below, Abstr. 2879.

2549 A. B. Conner. **Two Best Sweet Sorghums for Forage.** — *U. S. Dept. Agr., Farmers' Bull.* 458, p. 23. Washington, August 5, 1911.

United States

The sorghum (*Sorghum saccharatum*) region of the United States is approximately divided into 2 sections by the central line of Kansas and Missouri. The "Sumac" and the "Amber" varieties are considered the best types for the southern and northern regions,

(1) See Abstract 2347 *Bulletin* for July 1911. (*Ed.*).

respectively. The comparative figures presented in the following table are from data secured in northwestern Texas:

Growing Period, Yield, Leafiness, and other Qualities of the best 8 forage Sorghums.

VARIETY	Growing Period, Days	Yield Tons per acre	Number of Leaves	Estimated Sweetness per cent. (1)	Estimated Juiciness per cent. (1)	Estimated Tenderness per cent. (1)	*Remarks*
Red Amber .	92	4 ½	10 to 11	85	90	100	Suckers
Minnesota Amber . .	94	4	9 to 10	86	70	80	Do.
Orange . . .	98 to 108	6	11 to 12	80	80	90	Subject to blight.
Planter . .	102 to 112	6 ½	11 to 12	33	60	85	Lodges.
Sumac . . .	108 to 114	7 ½	14 to 16	90	95	80	Late
Gooseneck .	114 to 120	7 ½	14 to 16	100	100	75	Coarse, late.
Honey . . .	112 to 118	7 ½	14 to 16	100	100	80	Late
Sapling . .	108 to 114	5 ½	11 to 13	80	80	80	Lodges.

The best yields of forage depend largely on good seed and a well-prepared seed bed, but perhaps to a greater extent on the time, method, and rate of seeding. The thickest seeding that can be grown, without decreasing the yield, undoubtedly approaches nearest the ideal crop.

Sorghum-cowpea (*Vigna catjang*) mixtures may not give as great yields as sorghum alone, but the quality of the hay is superior. Sumac sorghum and some vigorous-growing cowpea, such as the Brabham or Unknown, seem to give the best crops.

(1) 100 represents the maximum. (*Ed.*).

Six parts of cowpeas to one of sorghum will give about the desired proportionate stand in the mixtures. Without irrigation, from 1 to 1 $^1_2$ bushels of seed per acre, when broadcasted, will give an excellent crop, while for irrigated lands 3 bushels is not too much. When seeded in rows, from 8 to 30 pounds to the acre is recommended.

For the best quality and quantity of forage, sorghum should be harvested when the seeds are in the late milk stage. If planted in rows, it can be cut with a corn harvester; if in close drills or broadcast, either a binder or a mower can be used.

The hay should be cured by putting it into shocks or cocks immediately after it has been harvested. This gives a bright, sweet, palatable feed. Sorghum hay should be stored as soon as possible after it has been thoroughly cured. Well cured sorghum hay is an excellent winter feed, and horses and cattle fed on it, with a small additional grain ration, can be kept in excellent condition.

Good seed crops can be secured with safety only in the less humid regions not infested with midge.

2550 **Guinea Corn in Curaçao.** — *The Journal of the Jamaica Agricultural Society*, Vol. XV, pp. 288-289. Kingston, July 1911.

As the island of Curaçao is very dry, the only grain crop grown there is Guinea corn. The cultivation is done in a very primitive way, the seed is sown as soon as rain falls, which time is irregular.

Curaçao Therefore the corn is sometimes sown as late as December, though it may be put into the ground in July.

When the crop is ripe and dry, the ears are gathered, and after that the stalks are cut, put up in bundles and stored. These stalks are the common feed for the animals in the dry season.

In the island of Aruba near by, they cultivate in like manner, but another kind of sorghum which is called "Seven Weeks Corn" as the bearing period begins seven weeks after sowing. This kind can be planted at any time if it rains, and bears at any time, not like the Guinea corn which bears only about April.

In Curaçao that kind of Guinea corn is not in favour, as it is likely to get spoiled by insects in the earing period; also it does not give so much forage, and the stalks are supposed to be less nourishing. On the contrary, in Aruba, they hold that the Curaçao corn needs more rain, is less nourishing, and is too hard.

The way of harvesting in Aruba, too, is not like the method practised here. There they cut the stalks with the ears before they

are dry, and heap them up. When dry, the ears are taken from the stalks; meanwhile there is a chance of a second crop from the same stalks. No manuring is done.

Cultivation of Rice in Portugal. (Rapp. dipl. ital. Coltura del riso in Portogallo). — *Boll. del Min. di Agr. Ind. e Comm.*, serie B, fasc. I, p. 20. Roma, 1 Luglio 1911. 2551

The area under rice in Portugal is only 8000 hectares (19 760 acres) and is confined to the marshy parts of the Vonga, Mondego, Tagus, Sado, and Guadiana valleys.

The average of the yearly crop is about 170 000 hectolitres (467 500 bushels). Portugal

The Government has sent an expert to Lombardy to study the Italian systems of rice-culture and to purchase selected seeds for distribution among Portuguese rice-growers. The varietes chosen comprise « Bertone », « Yellow, White, and Black Japanese », « Ostiglia », « Burma », and « Rubarello ». Prizes will be awarded to those Portuguese rice growers who obtain the best results in following the Italian systems and acclimatizing Italian varieties of rice.

ncreasing Rice Culture in the United States. (Domestic Rice Culture Increases Rapidly). — *Tropical Agriculturist.* Vol. XXXVII, No. 1, pp, 40-41, Colombo, July. 1911. 2552

The following is abstracted from a report of the United States Department of Agriculture (1).

In 1884 and 1885, a few farmers from the North-western prarie States settled on the great southern prairie which extends along the coast from the parish of St. Mary in Louisiana to the Texas line about 140 miles. Finding that rice was well suited to conditions of agriculture there, they commenced immediately to adapt the agricultural machinery to the rice industry. The gang plough, disc harrow, drill and broadcast seeder and finally the twine binder were adapted to the new crop. Wherever prairies were found sufficiently level, with an intersecting creek which could be used to flood them, they were surrounded by a small levee usually 12 to 24 in. high. Very few interior ditches, 12 to 18 in: deep and 4 or United States: Louisiana Texas

(1) See this *Bulletin* : Dec. 1910, p. 246.

5 ft. wide, were made for drainage, The land was so level that fields of 40 and 80 acres were common. Large crops were produced though raised in a very careless manner and regardless of quality.

A succession of dry years hastened the ultimate failure. The creek failed and reservoirs were found to be expensive and unreliable.

The soil and climatic conditions in South-eastern Texas are almost precisely like those in South-western Louisiana. There is a belt of prairie land well-suited to rice, extending from the Sabine river west for 250 miles, or more, along the coast.

Within a few years large farms have been opened and devoted to this cereal with excellent returns. The outlook for the further extension of rice culture is very promising, There are about 10 000 000 acres of land in the five states bordering on the Gulf of Mexico well suited to rice cultivation. The amount which can be successfully irrigated by present methods, using the available surface and artesian flows, does not exceed 3 000 000 acres. The best results require rotation of crops; consequently one half of that area would be in rice at any one time. At an average yield of 10 barrels (of 162 pounds) per acre. 1 500 000 acres of rice would produce nearly 6 times the amount of the present consumption in the United States.

2553 W. L. KELLEY. **Nitrogenous Fertilizers for Rice Fields.** — See above, Abstr. 2518.

2554 **Opening of New Markets for Manchurian Soy Beans** (1). (Soya Beans). — *Journal of the Royal Society of Arts.* Vol. LIX, No. 3066, p. 954. London, August 25, 1911.

A Yellow Book published by the Chinese Imperial Maritime Customs, and dealing with the subject of developments in Manchuria, refers in the following terms to the Soya bean:

China: anchuria

(1) Cp. *The Science and Practice of Farming during 1910 in Great Britain*, pp. 440, 613, 615; *Bulletin*, p. 55, November, 1911; *ibid.* Abstr. 1459, May, 1911; Abstr. 1717 and 1718, June, 1911. (*Ed.*).

Sir Arthur. Church states that the exportation of soy beans has given a great stimulus to the over sea carrying trade, affecting sensibly the rate of freight for great distances. The importance of the exportation of soy beans from Manchuria is shown by the fact that from the port of Dalny 150 000 tons of beans were exported during the season November 1908 to June 1909, and during the same period 143 000 tons from Vladivostock. Since then this export trade has still further increased (*Gardeners' Chronicle* Vol. XLVIII, No. 1203. p. 42. London 15 Jan. 1919. (*Ed.*).

« The Changchun-Kirin railway, now under construction, will in a couple of years open the way to the development of the Sungari region to its fullest capacity, and if this line is continued to the Korean frontier, new districts will be thrown open, while the Chinchow-Aigun line, or at least a portion of it, would, if constructed, traverse a country were beans might thrive. The eager competition to secure beans in Europe shows no signs of slackening; and the North American continent appears to be about to enter the field as a consumer...

With freight from Darien to Seattle at only 4 dollars (gold) per ton (20,39 fr. per metric ton), a good market should be developed. Soya beans are being grown in British West Africa and experimental planting is carried on in practically every British colony, but it seems doubtful whether such experiments can meet with success in competition with the Manchurian product, which is raised under ideal climatic conditions and by the cheapest possible labour ».

A. T. Wianko and C. O. Cromer. **Summary of Five Years' Results of Co-operative Tests of Varieties of Corn (Maize), Wheat, Oats, Soy Beans and Cow-Peas, 1906-1910.** — *Purdue University, Agricultural Experiment Station, Bull.* No. 149, Vol. XV, Lafayette, Indiana, U. S. A., March, 1911. 2555

The following table shows the average results of the Soy bean variety tests for the period 1906-1910 inclusive: United States: Indiana

VARIETIES	Average Yield per acre			
	No thern Indiana		Southern Indiana	
	Hay in pounds	Grain in bushels	Hay in pounds	Grain in bushel
Ito San	2551	18.2	2102	13.7
Early Brown	2550	19.1	2169	13.5
Hollybrook	2955	19.5	2461	13.4
Dwarf Early Yellow	2472	15.5	—	—
Medium Early Yellow, or Mammoth	—	—	2842	14.1

The varieties of soy beans included in the above table differ somewhat in habits of growth and size of plants, but mainly in the length of season required for full development; the choice of varieties, therefore, rests mainly upon the factor of relative earliness,

Under Indiana conditions, the soy bean is primarily a seed crop, although the larger, finer stemmed varieties will give fair yields of excellent forage if cut before the stems become too woody. Besides the valuable grain production, owing to the high protein content of the seed, the nitrogen gathering power of the soy plant and its good effect upon the physical condition of the soil, make it valuable also as a soil improver.

The Ito San soy bean is a medium sized, medium maturing variety. Tbe Early Brown and Dwarf Early Yellow are similar to the Ito San. The Hollybrook soy bean is a strong growing, strong stemmed variety of good yielding power, its time of maturity is relatively late, The Medium Early Yellow is a late, tall growing, branching variety with relatively fine stems, better adapted for forage production than any of the other varieties tested. (1).

2556 M. W. Evans. **Field Pea Production in Washington.** — *State College of Washington; Agric. Exp. Sta. Bulletin* No. 99. Pullman Washington, 1911

United States

This Bulletin is a report of the co-operative investigations as to the possibility of growing field peas as a forage crop in Washington, which have been conducted at the State Agricultural Experiment Station of Pullman for the past three years.

The results of these experiments indicate that field peas can be grown successfully in many parts of Washington, and practically the same machinery that is already at hand on most farms can be used.

The high proportion of protein contained in both the hay and the seed of field peas makes this a valuable crop for feeding in combination with corn fodder, timothy hay, grain hay and grain from the ordinary cereal crops.

Field peas are well adapted for growing in rotation with grain on much of the farming land in Washington. The ability of the

(1) According to Sir Arthur Church the numerous varietes of soy beans « give this bean a very important position among leguminous plants, as a food stuff capable of substituting rice and other starch bearing seeds. See the *Gardeners' Chronicle*, Vol. XLVII, N.

plants to gather indirectly nitrogen from the air, and leave a portion of this nitrogen in the soil, in forms available as food for succeeding crops, makes them a useful crop for maintaining the fertility of the soil.

The Bengal Bean. — *The Agricultural News*, vol. X, No. 235, p. 139, Barbados, April 29, 1911. 2557

Work has been undertaken recently by Messrs. C. V. Piper and S. M. Tracey, of the United States Department of Agriculture, having for its object the determination of the true botanical relationships of various plants which were considered to belong to the genus *Mucuna*. The purpose of the investigation was to find plants closely related to the Florida velvet bean which would attain maturity earlier, and be thus more suited to the conditions in the Southern States. The receipt of seeds of plants resembling the Florida velvet bean, growing in Brazil and the Philippine Islands, made it seem expedient to try to collect plants of all the other species of the genus *Mucuna*, in order to find varieties that would reach maturity more quickly, or prove more valuable, than the Florida velvet bean. Previously, this plant had been shown to belong to the genus *Stizolobium*, and not to *Mucuna*, and had been named *Stizolobium deeringianum*. (1) The result of the work of the investigators mentioned, published in *Bulletin* No. 179 of the Bureau of Plant Industry of the United States Department of Agriculture) has been to show that at least 20 distinct plants that were once regarded as species of *Mucuna* belong to the genus *Stizolobium*. Further, it has been demonstrated that these plants show greater possibilities of usefulness than have been attributed to them, so far. United States

The « Bengal » or « Mauritius Bean » has been generally described as *Mucuna utilis*, or *Mucuna pruriens* var. *utilis*. Specimens of this bean at Kew sent from Barbados were identified as belonging to the species *Stizolobium aterrimum*.

S. aterrimum appears to be more widely cultivated than any of the other Stizolobiums, as they have received specimens from Australia, Cochin-China, Mauritius, Java and Ceylon, in addition to those already mentioned from Brazil and Barbados. The plant is

(1) The *Index Kewensis* does not recognize the genus *Stizolobium* which ti considers as a synonym of *Mucuna*.

See also below, Abstr. 2558. (*Ed.*).

grown in Hawaii under the name « Mauritius bean »; a name for it in Brazil is the horse-eye bean. The habit of the plant varies to some extent in different parts of the world.

As a result of the investigations, the « Bengal bean » is to be known as *Stizolobium aterrimum*, and the « Florida velvet bean » as *S. deeringianum*. In addition, the cowitch, or cowhage, will be called *S. pruriens*, and the « Lyon bean », or Sabual, from the Philippines, *S. niveum*

2558 **The Velvet Bean, *Mucuna pruriens* var. *utilis*.** — *U. S. Dept. of Agriculture, Farmers Bulletin* 451, Pp. Washington, May 29, 1911. — Compiled from the following ; Alabama Coll. Sta Bull. 104 ; Florida Sta. Bull. 60 and 102 ; North Dakota Sta. Bull. 35; U. S. Dept. Agr. Farmers' Bull. 78, p. 12 ; 102, p. 41 ; 300, p. 9; Bur. Plant Industry Bull. 41, p. 25 and 129; Div. Agrostology, Circ. 14.

United States

The Velvet Bean (*Stizolobium deeringianum*) (1) is an excellent catch crop, and very successfully grown in order to get rid of weeds. It is also, to a small extent, used as food. A full crop, plonghed in as green manure is equivalent, as to nitrogen supplied, to 1893 lb. per acre of cotton seed meal containing 7.5 % of nitrogen, calculated as ammonia.

One ton of pods with seeds contains 53.77 lb. of nitrogen, 31.29 lb. of potash and 13.66 lb. of phosphoric acid, and has a fertilizing value of 10 to 11 dollars. The pods have a much higher percentage of potash and phosphoric acid.

In Florida the Velvet Bean can be grazed from December onwards until the other new grasses appear in spring, as only about 50 % of the leaves and stems are grazed off, the rest forms a considerable increase of humus for the benefit of the succeding crops. It is calculated that one animal can be fattened on an acre and a half.

In Florida the Velvet Bean enjoys the same immunity as the cowpea, *Vigna Catjang*, from the nematode which causes Root Knot.

(1) According to Bailey and Gertt van Wijk, Velvet Bean, Florida Velvet Bean, and Banana Bean, correspond to *Mucuna pruriens* var *utilis*. See L. H. Bailey, *Cyclopedia of American Horticulture*, vol. II, p. 1036, 5th. edit. N. York. 1906. See also H. L. Gertt van Wijk. *A Dictionary of Plant Names*, the Hague, p. 860, 1911.

See above, Abstract 2537. (*Ed.*)

The area under Velvet Bean in Florida was 10 822 acres in 1901 and 22 924 acres in 1907-8.

The Velvet Bean is a tropical plant, which requires about 8 months to attain full development of the stem and production of the seed.

It can be cultivated up to the latitude of central Missouri; but it cannot produce a really good crop of beans further north than about 200 miles from the gulf coast. If grown alone, the plants must be kept 10 to 16 inches apart in the rows, and these 4 ft. from each other; that is about 0.26 bushels of seed per acre.

It is better, however to sow in rows 6 ft. to 7 3/4 ft. apart with alternate rows of maize or sorghum as supports to the pea vines. This method ensured a crop of 20 bushels of beans, per acre, at the Florida agricultural station, whilst the preceding method had yielded 22 1/2 bush. per acre. The maize harvested was from 5 to 10 bush. per acre.

At the Alabama Agric. Station 65 cwt. per acre of hay were obtained from rows 2 ft. apart; whilt the best crop of hay from broad-cast sowing was 47.8 cwt. per acre. With cowpeas also the same method gave the best results.

In the Florida experiments no benefit was obtained from the use of manures.

As a food for live stock, the Velvet Bean is very rich in nitrogen; it is not advisable to use it alone as it is liable to cause abortion in cattle and swine, and ataxy in horses.

When horses are fed exclusively on Velvet Bean, they are subject to kidney troubles, but this danger can be easily avoided by mixing the hay with equal quantities of crab grass. (1)

It is also said that the fat of swine fed too exclusively with Velvet Bean has a brownish colour and a disagreable taste and smell.

Velvet Beans have only one serious pest, the caterpillars of *Anticarsia gemmatilis* which feed on their leaves. The plants are rarely attacked before flowering commences.

Black birds, Rice birds and the green sparrow are very useful in controlling this pest when it appears in numbers. (2)

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(1) Crab grass is one of the names of *Eleusine indica;* it is given also to some *Panicum. P. Sanguinale* H. BAILEY. *Cyclop. Am. Hort.* II. p. 683. (*Ed.*)

(2) The Blackbird is one of the birds of N. America with black or dark coloured plumage. The red winged swamp Blackbird (*Agelaus phoeniceus*) emigrates in autumn in numerous flocks, the rust-coloured Blackbird (*Scolecophagus carolinus*); the yellow-headed Blackbird or Copperhead (*Xauthoce-*

The best artificial treatment is from 1 to 3 pounds per acre of Paris green, the well known arsenical insecticide.

2559 **Manuring of Potatoes.** (*Midland Agric. and Dairy Coll. Kingston, Derby. Bull.* 3, 1910-11). Abs.: *The Journal of the Board of Agriculture*, Vol. XVIII, No. 5, p. 417. London, August, 1911 (1).

United Kingdom: England

A trial of the effect of artificial manures in addition to the usual farmyard manure was made at four centres in Lincolnshire and at the College farm, Kingston, Derby. The conditions and soil varied somewhat, and at one centre no farmyard manure was used. The best yield was obtained from a mixture of 1 ½ cwt. sulphate of ammonia, 4 cwt. superphosphate, and 1 ½ cwt. sulphate of potash per acre, with from 10 to 20 tons of farmyard manure. This dressing cost 44s. per acre, and gave an average increase in crop over the plot without artificials of 32 cwt. of ware potatoes. Various other mixtures, including nitrate of lime, calcium cyanamide, fish meal, and some proprietary potato manures gave smaller increases for a similar cost of manure.

2560 E. Heckel. **A New Variety of Potato. The *Solanum Maglia* of Chile.** (2) *Comptes Rendus des Séances de l'Académie des Sciences.* Vol. 153 No. 7 pp. 417-420. Paris, 14th August 1911.

France. Chile

Mr. Heckel communicates the results obtained in 1911 with very early products of the bud mutation of the wild tubers of *Solanum Maglia* (3) or Chilian potato. These tubers, fully ripe by the 8th August, are uniformly violet like the Labergerie violet and have the same shape. Their weight ranges from 350 to 380

phalus xanthocephalus) of the North West of the United States and the Crow-Blackbird (*Quiscalus*) are well known species.

The rice bunting (*Dolichonyx oryzivora*) is called Bobolink in the south of the United States where it feeds on rice in the autumn. See: *Food of the Bobolink, Blackbrids* and *Grackles*.

Bull. 13 of the Bureau of Biological Survey, U. S. Dept. of Agric. (*Ed.*)

(1) See Abstr. 804 and 806. *Bull.* March 1910. (*Ed.*).

(2) See Abstract 743 *Bulletin* March, 1911. (*Ed.*).

(3) S. Maglia Schlecht. "Darwin Potato". Thinner and more slender than the *S. tuberosum* and nearly or entirely glabrous. See L. H. Bailey, *Cyclopedia of American Horticulture*, vol. IV, p. 1678. London 1902. (*Ed.*).

grammes; each individual yields an average of 2 kg. (4 1/2 lb.) of tubers. These plants withstand the fungoid diseases which ravage old potato plantations. Agriculture must turn this plant and its seeds to account as a safeguard against the parasites which infest, and so seriously threaten this culture.

Mr. Heckel announces that he induced M. Verne, a professor in the University of Grenoble, to undertake a long voyage in South America for the purpose of gathering wild potatoes in the Andes (3 000 to 4 000 metres). M. Verne visited Uruguay, Argentina, Brazil, Chile, Peru and Bolivia. He brings back specimens of a large number of varieties of wild tubers which will be subjected to cultural bud mutation, following Mr Heckel's method (supermanuring with farm manure). The experiments on growing *Maglia* were carried out on the property of M. Bellon, at Saint-Gérome, à suburb of Marseilles.

Potato-Alcohol in Russia. — *Journal of the Royal Society of Arts.* No. 3062. p. 902. London, July 28, 1911. 2561

In the alcohol distilling industry of Russia, potatoes are annually increasing in importance, the alcohol produced therefrom exceeding that from all other sources. Apart from the large quantities of potatoes purchased every year by the factories from peasant producers and estate owners, whenever they have a surplus which they cannot more profitably dispose of, there are large plantations devoted solely to the production of potatoes for distilling purposes, and there is also a tendency to increase these plantations. Russia

The potato crop for 1910 was greatly in excess of that of the previous year, which was also a good one, and the quality of the tubers was in most districts better than in 1909. It is generally supposed that the climate of Russia is favourable for the production of potatoes in vast quantities, and that with the aid of fertilisers their production can be increased to meet all demands of distillation: the production of denaturated spirits for industrial and illuminating purposes now being only in its infancy.

FAUCHERE. **Yield and Cost Price of Cassava Root in Réunion and Madagascar.** (La culture du manioc) *Colonie de Madagascar et Dépendances. Bulletin économique*, 10e année, No. 1, p. 141-151. Tananarivo, 2e semesstre 1910 (Received 24th August 1911). 2562

Cultivated Cassava belongs to several species of the genus *Manihot* or *Jatropha*. The two best known species are the *Manihot* Réunion. Madagascar

utilissima and the *M. aipi* (or M. dulcis) (1). There are severa varieties of Cassava in Madagascar, but in the Tananarivo region hardly more than three are known: the « Mangahazo Gasy », the « Mangahazo Masombica » and the « Mangahazo Boriboana ». The latter is held in most esteem. It seems to correspond to the variety known in Réunion under the name of « Camanioc ».

The yields of Cassava vary very greatly. In the Island of Reunion, 20 to 25 tons per hectare is regarded as a good yield of Camanioc and 50 to 60 tons as an exceptional harvest. The Soso Cassava when cultivated in the field gives a yield exceeding that of Camanioc by about 15 to 20 %. Singapore Cassava, which ripens in the course of a year (instead of 18 to 24 months) produces about $^1/_5$ less than Camanioc. On the East coast of Madagascar the production approaches 25 tons without manuring ; in the environs of Tananarivo it is barely 10 tons per hectare. In Brazil this culture yields from 25 to 30 tons per hectare. (2).

In Réunion the cost price of a hectare (2.47 acres) of Cassava (and Maize as an alternating culture) is made up as follows :

	Francs
General expenses	20 —
Interest on capital	80 —
Two crossed harrowings	10 —
Ploughing	80 —
Carting Cassava and Maize	75 —
Planting	25 —
Upkeep	105 —
Harvesting (lifting)	37.50
Preparation of Maize	1.50
Alternate planting	10 —
	444 —

(1) The difference between the species *Manioc utilissima* and *aipi*, based on the toxicity of the fomer species, is far from being absolute. It is certain that both contain hydrocyanic acid, and, orher conditions being equal, the *Manihot utilissima* more than the *aipi*. Those interested incline to the view however, particularly in Réunion, that methods of cultivation and habitat exercise a very great influence on the formation of the poison, and that the *Manihot utilissima* may become innocuous, and, on the contrary, the *M. aipi* poisonous, as the case may be. In Madagascar, all the Cassava cultivated appear, to belong to the category of sweet Cassavas. It is not rare however to find the Cassava roots becoming charged with bitter substances in certain positions, particularly on lowlying lands. In Réunion it is held that the Cassava often becomes bitter when successive harvests are made on the same land, with slips obtained from these harvests. (*Ed.*).

(2) According to the data collected by M. Semler, each Cassava plant produces on the average 4 to 6 kilogrammes of tubers ; the production per hectare is said to be 40 000 to 60 000 kgs. H. SEMLER. *Die Tropische Agricultur*. Wismar, 1900, II, p. 787. (*Ed.*).

Products :

30 tons of Cassava at 15 fr.	450 —
1.2 » » Maize at 150 fr.	180 —
	630 —

Profit per hectare : fr. 630-444 = fr. 186 —

In Madagascar the expenses seem to be very much lower. They are made up approximately as follows :

	Francs
General expenses (only noted, to be reduced as much as possible)	
Two ploughings and harrowing	30
Planting Cassava (by hand)	15
Upkeep (hoeing twice and ridging once)	60
Lifting	20
Cleaning and conveying to works	10
Manuring	45
	180

In Sambirano, a hectare of Cassava involves an expenditure of about 145 francs, and produces from 25 to 40 tons of green roots. Allowing for depreciation of plant, buildings, cattle and general expenses, each hectare grown with Cassava in Sambirano would give 225 francs net profit.

A ton of green Cassava yields about 400 kg. of sliced and dried Cassava with the black skin removed. The Camanioc furnishes from 18 to 20 % of starch. Factory expenses in the Island of Réunion are 56.50 fr. for tapioca, and 41.50 fr. per ton for starch. Absolutely dry Cassava contains 97.5 % of constituents convertible into sugar (M. de Brévans' laboratory experiments). In industry 100 kg. of dry Cassva produce from 45 to 50 litres of a very full alcohol of 90° strength, with easily rectified residue. The Cassava flour may also be employed for feeding calves (1).

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3) See Abstr. 1232 *Bulletin*, April 1911. (*Ed.*).

2563 **Superphosphate or Mineral Phosphates for Swedes.** (*Midland Agric. and Dairy Coll,, Kingston, Derby, Bull.*, 7, 1910-11), Abs. *The Journal of the Board of Agriculture*, Vol. XVIII, No. 5. pp. 417-418. London, August 1911.

Great Britain: England: Derbyshire

It is commonly thought that soluble phosphates are desirable as being more available for the immediate requirements of the plant. but there is every reason to believe that soon after they are applied to the soil they combine with lime, and there are consequently good grounds for thinking that the practical value of soluble phosphates is due, not so much to their being taken up easily by the plant, but to their solubility ensuring their minute sub-division and even distribution throughout the soil particles. If fineness of division is the object in view, it was thought that an experiment could be usefully carried out to ascertain whether the same object could be obtained by reducing ordinary mineral phosphates to a fine powder, thus saving the cost of treating them with acid to form superphosphate. The experiment forms, therefore, a comparison between the mechanical and chemical preparation of phosphates. Nitrate of lime is also being tested, as well as the effect of ground lime, in order to see whether there is reason for the opinion that insoluble phosphates are more beneficial on soils lacking in lime and rich in organic matter.

This report contains the results which have been given by 500 lb. superphosphate, 173 lb. Florida phosphate, and 250 lb. Charleton phosphate, these amounts containing equal quantities of phosphate. As the experiments have only been in progress for one season it would be premature to draw conclusions at present, but they are sufficient to show that the mineral phosphates are likely to be well worth attention in the problem of swede manuring.

2564 **Manuring of Mangolds.** (*Midland Agric. and Dairy Coll., Kingston, Derby, Bull.* 4, 1910-11). Abs.: *The Journal of the Board of of Agriculture.* Vol. XVIII, No. 5, p. 417. London, August, 1911.

Great Britain: England: Derbyshire

In the course of preliminary trials extending over five years, a standard dressing of artificials for use with farmyard manure for mangolds was determined, and during three subsequent years this dressing has been further tested, and has given the best results. It is made up as follows: Sulphate of ammonia, 100 lb., applied at seeding; nitrate of soda, 130 lb., at singling; superphosphate 750 lb., at seeding; either sulphate or muriate of potash, 120 lb.,

at seeding; and common salt, 2 ½ cwt. applied in March. This was used in addition to, from 10 to 25 tons per acre of farmyard manure. It cost 55s. 6d. per acre, and every year, gave a profit, the mangolds being valued at 12s. 6d. a ton.

F. HEDLEY, AULD and JOHN BRACKEN. **Alfalfa in Saskatchewan, the Alfalfa Growing Competition.** — A *Bulletin prepared under the direction of the Committee appointed by the Minister of Agriculture to conduct the Competition.* Saskatoon, Saskatchewan, 1911. **2565**

At the Agricultural Societies' convention in Regina in January 1910 the following resolution was passed : « Resolved that this convention approves of the suggestion that one thousand dollars be raised by subscription to be given as a first prize for the best field of alfalfa consisting of ten acres in the year 1914, and that the Minister of Agriculture appoint a committee to carry the same into effect. The subscription reached six thousand three hundred dollars. The Bulletin gives the rules for this contest. A map is given in this Bulletin indicating the different parts of Saskatchewan where alfalfa has been successfully grown in certain quantities. **Canada**

In some districts there have been failures and successes in different farms, in the same years. Origin of seed, preparation of soil, moisture holding capacity of soil and several other variable factors no doubt account for the degree of success obtained. Alfalfa has been grown at Maple Creek, Moore Jaw, Regina, Creelman, Oliver, Hanley, Saskatoon, Battleford and at other places on the open prairie. It has done well at Lloydminster, Rosthern, Duck Lake, Prince Albert and Kinistino in the north. It is being satisfactority grown in the districts adjacent to Grenfell and Wolseley. Soil and climate vary greatly in these different localities. Instructions for growing alfalfa are added.

G. C. DUDGEON. **Berseem, or *Trifolium Alexandrinum*** (1). — *The Department of Agriculture and an Indication of some of the Agricultural Problems in Egypt. The Agric. Journal of Egypt.* Vol. I, p. 6, Cairo, 1911. **2566**

Egyptian clover (*Trifolium Alexandrinum*) is usually implied when " berseem " is referred to in Lower Egypt, but the name is applied to several other species of green leguminous fodder crops, **Egypt**

(1) See Abstr. 812, *Bull.* March, 1911. (*Ed.*).

which have a recognized position in crop rotations throughout Egypt. Cattle thrive and grow fat upon the luxuriant green crop, and are usually fed to it upon the field. The number of cuttings or grazings to which berseem is subjected, is in accordance with the locality and variety, and whether the land is required for cotton in March or for maize later. The common kind which is grown in Lower Egypt (« Miskawi », irrigated) is attacked by several insect pests, most of which are also enemies to cotton. A minute Bruchid beetle is very injurious to the seed.

2567 JULIO STORNI. ***Reana Luxurians.*** **Good Fodder in Argentina.** (Sobre un forreje de gran rendimiento especial para Tucuman, Chaco, Formosa, Salta, etc.). *Gaceta Rural* Año IV, No. 47, pp. 829-833. Buenos Aires, Junio 1911.

Argentina: Tucuman

Mr. Storni has been experimenting on the *Reana luxurians* in Tucuman. This is a graminaceous plant, a native of Guatemala, now growing throughout Central America (1). The results having proved satisfactory, the desirability is being considered of introducing this plant into the hottest region of the Argentine Republic. It thrives in fresh and loamy soils. It is sown in spring at the rate of 15 kg. per hectare, if sown broadcast, and 25 kg. if sown in rows.

Afterwards, two weedings, and, in the case of rows, banking up, are all that is needed. Mowing is begun before the flowering time, when the height of the plant scarcely exceeds one metre, and it is continued until the end of the flowering period.

After earing, the *Reana* is 5 metres high. The yield is 100 tons per hectare of green fodder, 89 % of which is eaten by cattle (the lower wooden part of the stalks cannot be utilised).

The only particulars furnished by the writer regarding the composition of the green fodder are the following :

Water	48.72
Fibre	4.03
Ash	1.19
Albuminoids	3.02
Non-nitrogenous substances	10.19
Fat	0.82

(1) See Abstract 43 *Bulletin*, January 1911.

During the experiment the writer observed that *Reana* was subject to the attacks of *Diatrea saccharalis*, which began by devouring the leaves and then passed on to the collar, without however succeeding in piercing it.

Within a very short time this lepidopteron disappeared naturally, without having done much damage.

J. M. Scott. **Japanese Sugar Cane for Forage.** — *U. S. Deptm. Agr. Exp. Sta. Work. LXIV, Farmers' Bull.*, No. 457, pp. 24 (8-11). Washington, July 10th, 1911. 2568

J. M. Scott says (*Florida Sta. Bull.* 105) that there were in Florida 412 820 head of cattle on January 1st, 1900, and 807 000 on January 1st, 1910. On this latter date there were also 98 000 sheep and 456 000 hogs. In the writer's opinion the extra supply of forage needed by the rapidly increasing live stock can easily be obtained by the growing of Japanese cane. There is no other crop that can be grown in Florida that will produce such a large yield of forage at so small a cost. United States: Florida

Japanese cane was introduced through the Louisiana Sugar Experiment Station for sugar and syrup production, but is of practical value mainly as a forage crop. It will yield from 150 to 500 gallons of syrup per acre, but is not grown for this purpose because of difficulty in stripping and grinding. It may be used as silage for winter pasture or stored as dry forage. It is best adapted to the climatic and soil conditions in Florida and the southern portions of Georgia, Alabama, Mississipi, Louisiana and Texas, but will do well in any section in which the velvet bean (*Stizolobium deeringianum*) (1) will mature seed. This includes the territory within 200 to 250 miles of the northern coast of the Gulf of Mexico.

When pastured by cattle little of the cane is wasted. The silage is relished by cattle, and has proved about $^1/_3$ lower in cost than sorghum or corn silage, as it should not exceed 1.75 or 2 dollars per ton. As the cane is rich in carbohydrates, which include its sugar and fibre, it is well to mix it with high protein feeds. For this purpose velvet beans, cottonseed meal, soy beans. cowpeas, oil meal, alfalfa, or clover may be used, if available,

(1) *Mucuna pruriens*, var *utilis*. See Bailey *Cyclopedia of American Horticultore* p. 1908. Also above, Abstr. 2557.

Because of the bulky nature of the Japanese cane, the more concentrated foods are especially valuable.

After conducting feeding experiments, the writer recommends these rations:

1) 12 lb, of Japanese cane, 10 lb. of velvet beans (*Stizolobium; deeringianum*) in the pod, and 2 lb. of cottonseed meal, or;

2) 10 lb. each of Japanese cane and cowpea hay, and 8 or 10 lb. of velvet beans in the pod.

Directions for planting, cultivating, fertilizing and harvesting Japanese cane are given in the Bulletin under review (1):

2569 **Manuring for Milk** (Midland Agric. and Dairy Coll. Kingston, Derby Bull. 1, 1910-11). Abstr. in: *The Journal of the Board of Agriculture*, Vol. XVIII, No. 5. p. 416. London, August 1911.

Great Britain: England: Derbyshire

The experiment was begun in 1909 for the purpose of ascertaining whether superphosphate and sulphate of potash would give profitable returns on pasture land used for grazing cows for milk. A field in poor condition adjoining the college farm at Kingston, Derby, was taken, and two plots of four acres each (1.6184 ha.) were fenced in. The soil was of a strong, clayey nature, typical of most soils on the Keuper Marl formation. On account of indications of lack of lime, 10 cwt. per acre of ground lime was applied on both plots in the spring of 1909. On one plot 4 cwt. of superphosphate and 1 $^{1}_{2}$ cwt. of sulphate of potash were applied immediately afterwards, while to the other plot no manure other than the lime was given. No further manures were used in 1910. The effect was tested by comparing the milk yield of the cows. Two cows were grazed on each plot for a fortnight; they were then changed over, the two that had been on the non-manure plot going to the manured plot, and vice versa. This continued for five months, so that each lot of cows visited each plot five times. In order to allow the cows time to get accustomed to the different pasture, the milk of the second week of each fortnight only was taken into account, and the amount doubled to represent the fortnight's milk. By thus changing the cows from one plot to the other the effect of differences between the cows was minimised, and the only factor that could influence the result would be the manures applied.

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(1) These experiments are instructive for the South of Italy, the islands and the African and Syrian shores of the Mediterranean, as well as for Greece and Spain, in all of which countries the Japanes cane could be introduced as a forage plant. (*Ed.*).

Owing to the manured plot having much improved, a third cow was put on it on May 16th at the same time as the other cows, and kept on the same plot till the end of the season. In 1909 the third cow was introduced in July. During the five months the yield of the two cows while on the unmanured plot was 6 688 lb. and while on the manured plot 6 841 lb. The yield of the third cow on the latter plot was 3 392 lb., so that the total excess on the manured plot in 1910 was 3 545 lb., or 86 gallons, per acre. This confirms the result obtained in 1909, when an increase of 84 gallons per acre was obtained. The milk yield of the unmanured plot was 1 157 lb. more than in 1909, which would appear to indicate either an improvement of the pasture from the use of lime, or that it was a better grazing season, or perhaps a combination of the two causes.

Manuring of Seeds Hay. See above, Abstr. 2506. 2570

H. A. Allard. **Natural Crossing in Cotton.** — *The Agricultural News.* Vol. X, No. 233, pp. 102-103. Barbados, April 1, 1911. 2571

Investigations are being made by the writer for the purpose of ascertaining the extent to which natural crossing takes place among plants in cotton fields, whether these are being raised in the ordinary way, or for the purposes of selection and breeding.

United States: Arizona, N Georgia

The possession of accurate information on the subject is important, because in breeding and selection experiments, particularly, the isolation of the progeny rows, as regards cross pollination, must depend upon the readiness with which this may take place, through insects, the wind, or birds.

Attention is drawn to the fact that most breeders and growers of cotton have considered that such crossing does not affect more than 5 to 10 per cent. of the seeds; whereas O. F. Cook, in describing work conducted in Arizona, considers that natural crossing takes place very frequently, while W. L. Balls, in Egypt, is of the opinion, in consideration of his later work, that this amounts to 5 to 25 per cent. These conclusions are supported by the preliminary work described by the writer, and he has arrived at the conviction that natural crossing must be considered a most important factor, not only in all technical cotton breeding problems, but also in the extensive field operations of the practical grower who wishes to secure increased yields and higher quality.

The investigations were made while co-operative breeding work, begun in North Georgia in 1908, was being carried out. The varieties of cotton with which the observations were conducted were the Okra type with narrow leaves, the Willet Red, and a pure-bred strain of the Keenan variety. The seeds were sown, in a plot of land having an area of about ½ acre, so that the plants came up in the order: Willet Red, Keenan, Okra, Keenan, Willet Red, Keenan, Okra; thus every Keenan plant stood between one of the variety Okra and one of Willet Red. In the results, 1290 bolls were obtained, of which 260 showed evidence of having been more or less completely crossed in a natural way, giving a proportion of 20 per cent. It is probable, however, that the actual amount of crossing was greater than this, for many hybrid seedlings were doubtless lost because they had to be removed before they had grown large enough to display the distinctive characters which would give evidence of their true parentage. It is estimated that if these could have been retained, evidence would have been forthcoming that there was as much as 40 per cent. of crossing.

Although where cotton is not selected, such crossing may do much harm, it is not as detrimental where selection is constantly and carefully practised.

After a description has been given of the diagnostic characters of the hybrids, a short review is presented of the agencies which effect the natural cross pollination of cotton in the field.

Most of the work, by far, is done by insects, especially bees and certain species of wasps. The bee *Melissodes bimaculata* Lep. and the honey bee are probably the most abundant and constant visitors of cotton in Georgia. A list is given of all the Hymenoptera and beetles that had been taken by the writer during the 2 years of observation; this includes 26 species of Hymenoptera, and 7 of beetles.

Birds have been alluded to in connection with cotton pollination. Special mention is only made, however, of humming birds (1) which on their part, are not likely to take any place in effecting cross-pollination.

It was proved by the writer that a considerable amount of pollen may be carried in cotton fields by the wind, particularly after the middle of the day.

(1) The common humming bird of the eastern United States is the ruby-throat (*Trochilus colubris*) (T. N. Gill. in J. K. Funk - *A Standard Dictionary of the English Language* - p. 874. London, 1910). (*Ed.*).

W. Bateson. **Mendelian Analysis and Cotton Improvement.** — *Nature*, Vol. 87, No. 2186, p. 403, London, September 21. 1911 (Extract from the Opening Address to the Agricultural Subsection. Meeting of the British Association. Portsmouth, September 1911). 2572

The cottons of fine quality grown in India are monopodial in habit, and are consequently late in flowering. In the United Provinces, a comparatively early-flowering form is required, as otherwise there is not time for the fruits to ripen. The early varieties are sympodial in habit, and the primary apex does not become a flower. Hitherto no sympodial form with cotton of high quality has existed, but Mr Leake has now made the combination needed, and has fixed a variety with high-class cotton and the sympodial habit, which is suitable for cultivation in the United Provinces. Until genetic physiology was developed by Mendelian analysis, it is safe to say that a practical achievement of this kind could not have been made with rapidity or certainty. The research was planned on broad lines. In the course of it, much light was obtained on the genetics of cotton, and features of interest were discovered which considerably advance our knowledge of heredity in several important respects. This work forms an admirable illustration of that simultaneous progress both towards the solution of a complex physiological problem, and also towards the successful attainment of an economic object, which should be the constant aim of agricultural research. British India

Hastening Maturity of Cotton with Fertilisers. — *U. S. Deptm. Agr. Exp. Sta. Work LXIV, Farmers' Bulletin* 457, pp. 24 (14-15). Washington, July 10, 1911. 2573

In order to combat successfuly the boll weevil (*Anthonomus grandis*) much attention has been given to the development of early ripening varieties of cotton. Recent experiments at the North Carolina Experiment Station, reported by C. B. Williams (*North Carolina Sta. Report* 1909, p. 37), show the important extent to which early ripening may be promoted by judicious use of fertilizers. In a large number of tests, on a wide variety of soils, it was found that the use of fertilizers in all cases hastened maturity. About 50 per cent more cotton was open at the first two pickings on the fertilized plots than on those which had not been fertilized. The effect was, however, more marked on sandy and sandy loam soils Unite State

than on red clay soils. The most marked effect was obtained from the use of heavy applications of phosphoric acid.

Nitrogen was more effective than potash in hastening maturity. Air-slaked lime did not hasten maturity, but when used in connection with other fertilizing materials it increased their effect.

2574 **Cotton in Sicily.** (1) — *Feuille d'Information du Ministère de l'Agriculture.* No. 37, p. 2. Paris, 19 Septembre 1911.

Italy : Sicily

In several provinces of Southern Italy cotton has been cultivated on a limited scale, supplying but a very small part of the comsumption of native manufactures, and being used only for the production of coarse fabrics.

The sporadic character which this special cultivation has hitherto maintained is due to the marked preference of the growers for the annual varieties, which allow of alternating the culture with wheat and vegetables.

The annual cotton plant however is lower in yield than the perennial plants. Among the latter those of American origin are best suited for the Italian climate and particularly the Sicilian. In Sicily the most profitable varieties are the earliest. There are some cultivated in the United States which can be profitably harvested in four or five months, like the *King* Cotton in North Carolina.

Among all the varieties tested at Palermo those appearing best adapted for transplantation are : the *Caravonica Wool*, the *Caravonica Silk*, the *Mississippi* and the *Mitafifi*.

By crossing the *Caravonica Wool* with cotton plants sown on the open land in several provinces of the island and already naturalised, such as the *Terranova* and the *Caltagirone*, an intermediate variety might be obtained combining the strength of the one and the powers of resisting climatic conditions of the other.

The *Mississippi* and the *Mitaflfi*, whose seeds come from Tunisia, are full and rapid in their development, which requires a period of only about 120 days. (2).

(1) See Abstract 449, *Bulletin* February 1911, and Abstract 1157, *Bulletin* April 1911. (*Ed.*).

(2) For particulars of the experiments on the Cottou varieties in Sicily, see reports of A. Borzi. director of the Palermo Botanical and Colonial Garden.

Cotton Growing in Burma. — *The Tropical Agriculturist*, No. 6, p. 560. Colombo, June, 1911. 2575

The growing of cotton in Burma is receiving considerable attention. The Myingyan district so far appears to be a succesful area for its cultivation.

Burma

Should this be confirmed, the Lancashire cotton manufacturers will be much relieved, as their industry at present depends for its very existence upon foreign, other than American, supplies of raw cotton. The reports of experts show that there is no valid reason why Burma should not become a great cotton-growing area, and this has led to the launching of many schemes. Practical work is already being carried out, the experimental stage being to a certain extent finished.

Cotton-Growing in The Dutch East Indies (Der Baumwollanbau in Niederländisch-Indien). — *Deutsches Kolonialblatt*, XXII Jahrg. No. 16, p. 594. Berlin, 15 August 1911. 2576

Cotton-growing occupies 2115 « bouw » (about 3 700 acres) in eight Residencies in Java, and 10 412 bouw (18 220 acres) in four administrative districts of the surrounding possessions: making in all 12 527 bouw. The most important centres of this cultivation, which dates back to a fairly remote time, are the Residencies Modioen and Samaranga, in the central part of Java. The regencies of Preanger, Cheribon and Pekalongan (North-West coast) are also very important. In the other islands, cotton-growing has also long been carried on; it is widespread in the Residence of Palembang (South-East coast of Sumatra) and the small islands of the Sunda Archipelago, Bali and Lombok. The principal exporting ports of Java are Samarang and Soerabaja.

Dutch East Indies

The cotton produced is of pretty ordinary quality and the fibres rather short. The price of raw cotton may be estimated at 0.10 florins per kilogramme; that of spun cotton at 0.5 florins per kg. (from 1 *d* to 4 ½ *d* per lb.).

The amount of exports is indicated in the following tables:

Spun Cotton.

	From Java kgs.	From other possessions (Palembang) Kgs.
1909	345 208	64 528
1908	994 648	112 717
1907	1 486 500	154 069

Raw Cotton.

	From Java kgs.	From other possessions (Palembang, Bali, Lombok) kgs.
1909	697 652	6 681 906
1908	4 224 002	5 419 208
1907	2 599 895	5 261 339

The greater part of the raw product is taken up by Eastern markets (Singapore, Hong-Kong, Japan); the worked product is exported almost exclusively to Australia, and a small portion to Europe (Netherlands and Germany).

2577 **Cotton-Growing in Asia, Africa and Sonth America.** — *The Agricultural News*, Vol. X, No. 234. Barbados, April 15, 1911.

North Borneo. (1) Attempts to grow « Sea Island » cotton have not been successful. It appears however, that British Borneo possesses strains of cotton that grow well in the country, and yield a useful fibre. Large plantings have been made of the silk cotton (kapok) tree (*Eriodendron anfractuosum*), but it is too early at present to determine the commercial value of the fibre of this plant in British Borneo.

N. Borneo. Transvaal. Argentina

The Transvaal. — Satisfactory progress is being made with most of the cotton experiments in the Transvaal, and increasing areas of the plant are being sown. The trials that have been made show that almost the whole of the low veldt, and many parts of the middle veldt, are suitable for cotton-growing; but that this is not at all the case in regard to the high veldt. A matter of further encouragement is that the normal Transvaal climate appears to be well suited to cotton, as the rainy season from December to April is available for its growth, while the dry season, during which the crop can mature and be picked, commences in May. It has been found that the most suitable districts for cotton-growing are situated in the eastern foothills of the Drakensberg, the Zoutpansberg, Lydenburg, Barberton, and Piet Retief districts, as well as in Swaziland. The improved types of « American upland » cotton have so far given the best results.

Argentina. (2) A circular issued by the Argentine Department of Agriculture shows that investigations have demonstrated that the

(1) See Abstr. 2117 *Bull.* July 1911.
(2) See Abstr. 2115 *Bull.* July 1911. (*Ed.*).

extension of cotton cultivation in the State has been retarded by special circumstances, as the plant itself appears to be well suited to the conditions that obtain where it is grown, and gives reasonable yields. In order to encourage cotton-growing in the State, the Office of Agricultural Competitions and Exhibitions is devising competitions to be held among the cultivators of cotton plantations and cotton producers. For this purpose, seed of different varieties from the United States is being distributed; among these are « Russell », « Culpepper », « Texas Wood », « Dickson », « Strickland » « King » and « Simkin ».

Cotton-Growing in Australia. (Baumwollkultur in Australien). — *Das Handelsmuseum*, No. 30, p. 471. Wien, 27 Juli 1911. 2578

Notwithstanding the encouragement given by the Australian Government, cotton-growing makes no great progress in the Commonwealth.

Australia

At Port Darwin, in the plantations of North Queensland, and in the Kimberley District (Western Australia), the results were fairly satisfactory, white workmen having been engaged.

It has just been proposed that the British Cotton Growing Association should send from 200 to 300 families into the zones best suited for cotton growing.

Sea Island Cotton in Hawaii. — *The Agricultural News*, vol. X, No. 242, p. 246. Barbados, August 5th, 1911. 2579

One difficulty which has been experienced in growing Sea Island Cotton in Hawaii is that of excessive yield, which results in a too prostrate form of growth.

Hawaii

In one locality on the windward side of Oahu, where the rainfall is about 70 inches per year, 2 acres of Sea Island cotton required about 5000 props in order to keep the branches from lying upon the ground and causing the bolls to rot. In this respect the Caravonica cotton is superior to Sea Island, since it invariably has an upright habit of growth. The difficulty experienced with the prostrate habit of the Sea Island can be appreciated from a consideration of the fact that, in the 2 acre field just mentioned and in another 1 acre field, on the leeward side of Oahu, the average number of bolls per plant was 700, and on one tree 1200 bolls were counted at one time. This produces a weight

under which the slender branches of the Sea Island cannot support themselves in an upright position.

An elaborate series of pruning experiments is now being carried out with the idea of learning a method by which an upright growth can be induced in the Sea Island cotton, at least for the second and subsequent years of the crop. Some promise is already held out by these experiments. A strain of Sea Island, secured from one of the best plantations of James Island (S. C.) shows a more upright habit of growth than any other strain of Sea Island which has thus far been secured.

2580 **Cotton in the United States in 1910.** — *Questions Diplomatiques et Coloniales*, No. 249, p. 315. Paris, 1er Septembre 1911.

The United States in 1910 exported 530 million dollars' worth of raw cotton as compared with :

United States

462	million	dollars'	worth	in 1909
439	»	»	»	in 1908
470	»	»	»	in 1907
413	»	»	»	in 1906

Before 1906, the value of the United States cotton exports had never attained the figure of 400 million dollars.

Exportation usually absorbs two thirds of the total cotton production of the United States, the other third being taken up by American industry. The value of the United States cotton exports to the principal countries of destination is approximately as follows, in 1910 :

Great Britain	243	million	dollars'	worth
Germany	140	»	»	»
France	62	»	»	»
Italy	28	»	»	»
Spain	16	»	»	»
Canada	10 ½	»	»	»
Japan	9 ½	»	»	»

The value of cotton imported into the United States in 1910 is estimated in round figures at about 15 000 000 dollars, 10 000 000 dollars' worth coming from Egypt, 2 from England (Colonial production) and 1 3/4 from Persia and China.

In all the cotton-growing States of the Union except Georgia and Louisiana there was an increase of production in 1910, as compared with 1909.

The Greatest Crop of Cotton. — *The American Review of Reviews*, Vol. XLIV, No. 3, p. 268. New York, September, 1911. 2581

The bright spot in the agricultural year is the splendid cotton crop, which now promises to be more than 14 700 000 bales. Previously the largest production was in 1904, in which year the yield was less by upwards of 1 000 000 bales, which gives some idea of the phenomenal character of this year's crop (1). Should cotton sell this year at the same average price it brought in 1910, the value of the 1911 crop would be slightly more than $1 000 000 000; if the price recedes to the average figure of the past five years, 11.5 cents per pound, the cotton raisers will still receive the enormous sum of $800 000 000. United States

Cotton Growing in Algeria (2). — *Bulletin Agricole de l'Algerie et de la Tunisie*, No. 13, pp. 329-332. Alger, 1er Juillet 1911. 2582

Cotton growing has now become an established practice with the planters of Oran. The perseverance of the planters, who have devoted themselves to cotton growing for 5 years past, is a proof of the remunerative results accruing. Algeria Oran

The yield - in 1910 - did not exceed 1 000 kilogrammes of raw cotton per hectare (7.964 cwt. per acre) ; whereas in previous years it amounted to 1500 to 1900 kilos.

The " Société Coopérative Cotonnière d'Orléansville " has greatly expanded this business. The area planted with cotton this year in the Orléansville region was 425 hectares (1 050 acres) while in the previous year it did not exceed 72 hectares (178 acres). The Society has enlarged the Orléansville ginning works, and a refinery has been attached to the oil factory.

F. Godard. **Cotton in the Region of Philippeville, Algeria.** — *Bulletin de l'Office du Gouvernement général de l'Algerie*, XVIIe Année, No. 5, pp. 229-230. Paris, 1er Août 1911. 2583

In the region of Philippeville the cultivation of the cotton plant without irrigation has been a perfect success. The varieties Algeria

(1) See above, Abstr. 2402,

(2) See Abstract 111 *Bulletin* January 1911. Abstract 823 *Bulletin*, March 1911. Abstract 1406 *Bulletin* May 1911. (*Ed.*).

cultivated are : Mit Afifi, medium staple (Egyptian), and Mississipi, short staple (American). The early character of the latter variety renders its cultivation possible over extensive zones in Algeria. In 1908 the harvest of Mississippi was 9 quintals of raw cotton per hectare (about 7 cwt. per acre) and that of Mit Afifi 9.20 quintals to the hectare. These cottons when ginned yielded : for Mississipi 32.34 % of the raw cotton ; and for Mit Afifi 33.90 %.

A landowner in El-Arouch cultivated 2.25 hectares of Mit Afifi cotton in 1909 ; his crop was 22.61 quintals of raw cotton yielding after ginning 7.16 quintals of fibre and 14.89 quintals of seed. The expenses of cultivation are calculated as follows :

	Francs
Preparing the soil	85
Seeds and upkeep of culture	148
Chemical fertilizers and spreading them	152
Picking at 5 fr. per 100 kilos	113.05
Packing and conveyance to ginning works	33
Cleaning land after crop	12
Wear and tear and depreciation of plant and animals	54.40
Total . . .	597.45

The fibre and seed were sold at fr. 2 397.45 net after paying costs of ginning and conveyance to place of delivery. The profit therefore was 2 397.45 fr. — 597.45 fr. = 1800 fr., i. e. 800 fr. per hectare (£ 13 6*s* 8*d* per acre).

In 1910 the yield of raw cotton per hectare reached the high level (for non-irrigated cultivations) of nearly 12 quintals (9.5 cwt. per acre).

2584 **Cotton in Uganda**. (1) — *The Agricultural News*. Vol. X, No. 240, p. 215. Barbados, July 8, 1911.

Uganda

The Assistant Superintendent of Cotton Cultivation for the Eastern Province, in his report for the month of February 1911, states that instructions have been issued to growers that all old cotton plants must be uprooted and burned by the end of March; a great number of those have already been pulled up and stacked in the middle of fields, ready for burning, and it is not anticipated that any difficulty will be experienced in having the instructions carried out.

(1) See Abstr. 822 *Bulletin* for March 1911. (*Ed.*).

Very full instructions have been issued with regard to the coming crop. In areas affected last season by boll worm (*Heliothis obsoleta*), advice has been given to sow a trap crop of Indian corn. Growers have been told to commence sowing cotton any time after April 15, to finish before the end of July. Preparation of land has been begun early, and in some localities large numbers of plots have already been broken. Given a favourable season, it is anticipated that the increase in next season's output will be enormous.

Production of Cotton in the Uganda Protectorate (1). (Baumproduktion des Uganda-Protektorats). — *Deutsches Kolonialblatt.* XXII Jahrg., No. 16, pp. 595-596. Berlin, 15 August 1911. 2585

The value of the exports of cotton, cotton seed and oil from the Uganda Protectorate in 1910-1911 amounted to a total of £169 944 (4 291 086 francs) as against £ 58 528 in 1909-10, and £ 40 484 in 1908-09. Uganda

In 1909 there were exported :

Cotton without seeds .	1 634 tons	(1 660 metric tons)
Cotton with seed . . .	2 504 tons	(2 544 metric tons)
Cotton seed	1 604 tons	(1 630 metric tons)
Cotton seed oil	11 707 gallons	(53 190 litres).

The variety cultivated is exclusively the " Upland ". In Uganda this variety produces a longer fibre than in the United States.

The Government is carrying on acclimatisation tests with a view to introducing Egyptian varieties into the country. The results of these tests are dependent in a great degree on the amount of the rainfall occurring in the different localities.

The average rainfall in Uganda is 51 ¼ inches (1300 millimetres) ; it varies in different places from 38 ½ (978 mm.) to 83 ½ inches (2121 mm.).

Cotton growing is carried on by the natives. The Government distributes the seed free of charge, the sale and distribution by private persons being prohibited.

The Department of Agriculture sends its agents into the cotton growing regions to exercise general supervision and assist growers

(1) See page 66 *Bulletin* November 1911 ; Abstract 452 *Bulletin* February 1911 ; Abstract 822 *Bulletin* March 1911 ; Abstract 1156 *Bulletin* April 1911. (*Ed.*).

with their advice. The sale is free ; but every person intending to buy cotton is required to apply for permission to the Government.

This permission is granted free of charge, but the Goverment makes a point of withdrawing it from any buyer who has deceived the producer by paying him too low a price.

In the interior, where the value of money is not yet known, the Government sends buying agents.

It is anticipated that the harvest for 1911-12 will be nearly double the previous one. The Government will have contributed effectively towards this result by publishing the government decree fixing the time of sowing, the strict application of which will be enforced by a sufficient number of European employees.

Hitherto, sowing had been done at any time of the year.

There are four cotton ginning establishments in Uganda, with 50 gins, three combs and an oil press.

Cotton growing is in the hands of the natives, and practised on a number of small plantations, intermingled with other cultures, this forms such a hindrance to the spread of harmful insects and diseases, that cotton cultivation in Uganda is proof against the ravages which these plantations usually have to apprehend.

2586 **Development of Cotton Industry in Nyasaland.** — *Nature*, Vol. 87, No. 2180, p. 191. London, August 10, 1911.

Great progress has been made in the development of the cotton industry in Nyasaland (1). The total export of cotton from the Protectorate is valued as follows, in a Bulletin issued by the Nyasaland Department of Agriculture:

Nyasaland

	£	Francs
1903	3	75·75
1904-5	5972	149 298.50
1907-8	14 118	352 974·75
1910-11 (11 months only) .	59 441	1 486 038.25

According to Mr. Mc Call, the Director of the Nyasaland Deptm. of Agric., a further increase is still possible.

(1) See page 253. *Bulletin*, December 1910. (*Ed.*).

The Cultivation of Cotton in the Transvaal. (1) — *Journal of the Royal Society of Arts.* Vol. LIX, No. 3067, pp. 972-973. London, September 1, 1911. 2587

The development of the cotton-growing industry in the Transvaal has recently been making excellent progress. For some time past, experts have been endeavouring to induce farmers, whose properties are situated in that part of the country where the soil and climate are such as will give the plant a fair trial, to make tests. Many farmers who have made these tests have been convinced that good crops may be obtained from their land, and that this branch may possibly be made a profitable adjunct to their general farming operations. Transvaal

The efforts of the Government experimentalists have been attended with striking results.

A comparison between American-grown cotton and some from the Rustenburg experimental station, shows that one variety (Bancroft) at least is well up to the mark. The American yield test gives 48 bolls of seed cotton to the pound (106 to the kilogr.), whereas that grown at Rustenburg yielded 43 bolls to the pound (95 to the kilogr.).

This is regarded by Manchester experts as eminently satisfactory, the more so when viewed in the light of the productions of former years. The question that is vexing the promoters of extensive cotton cultivation is not so much whether the cotton equals the American standard, but whether it can be made a commercial success. As to this, there appears to be a wide difference of opinion. It is asserted in some quarters, that the demand for no other article is so far in excess of the supply as is the case with cotton. If this be true, it seems only reasonable to assume that if the cotton can be produced in sufficiently large quantities, a great industry will be built up in South Africa in due time. On the other hand, it must be borne in mind that the United States of America has an established market for the product. Inquiries are being prosecuted into the cost of the various items which add to the price of the article from the time it leaves the grower till it reaches its market. Until these facts are ascertained, it will be impossible to arrive at anything definite as to the net profit that can reasonably be expected by the grower.

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(1) See Abstr. 2217, *Bulletin* July 1911, and above, Abstr. 2577. (*Ed.*).

2588 P. J. Fourie. **Cotton Culture in South Africa.** — See below, Abstr. 2632.

2589 W. Bateson. **The Culture of Flax and the Problem of Selection.** — See above, Abstr. 2468.

2590 Grove. (Brit. Cons.) **The Flax Production in the Moscow Government and in Russia** (1). — Russia. *Consular and Diplomatic Reports*, No. 4690, pp. 1-15. London, June 1911.

Russia

In the Moscow Government, where the cultivation of flax plays such an important part, the harvest in 1910 did not give such abundant results as in the previous year; nevertheless, the position of Russia as a flax producing country was considerably better owing to the increased demand for flax from abroad, and this demand was influenced by the high prices which ruled for cotton and jute. Everything seems to indicate that this industry is capable of great expansion so far as Russia is concerned, as she will undoubtedly produce the raw material in larger quantities than at present, provided that prices remain firm and demand keeps steady.

The total exports for all Russia for the last five years are as follows:

Raw Flax	1906	tons	214 193
» »	1907	»	219 096
» »	1908	»	221 709
» »	1909	»	230 435
» »	1910	»	201 903
Tow . . .	1906	»	28 000
»	1907	»	35 806
»	1908	»	35 306
»	1909	»	40 258
»	1910	»	34 565

As regards the improvement of the flax trade the Pskoff Bourse Committee has adopted resolutions with the object of standardising flax in distinct grades. A further interesting development is furnished by the proposal to establish an annual flax fair at Ostrof. Flax is now booming in Russia, and it is almost certain that several new mills will be erected during the course of the year.

(1) See thi *Bulletin*: Nov. 1910, p. 68; March, 1911, Abstr. 825; April, 1911, Abstrs. 1161-1162; June 1911, Abstrs. 1742-1743; July, 1911, Abstr. 2118. (*Ed.*).

Flax from the British East Africa Protectorate. — *Bulletin of the Imperial Institute*, Vol. IX, No. 1, pp. 11-14. London, 1911. 2391

Samples of flax of the Pskof variety, which had been grown in the Limoru district of the Protectorate, were received at the Imperial Institute in 1908. They consisted of 1) retted flax straw, and 2) flax fibre. British E. Africa Protetorale

The following measurements were obtained on comparing the specimen 1) with a standard sample of flax straw grown in Belgium.

	Flax straw from East Africa		Flax straw from Belgium	
	in.	cm.	in.	cm.
Length of straw . .	30 to 40	76.2 to 101.6	30 to 36	76.2 to 91.44
Diameter, maximum	0.09	0.2286	0.064	0.16256
Diameter, minimum.	0.04	0.1016	0.032	0.08128

The clean fibre (sample 2) was of very good strength and had an average diameter of 0.00073 in. (0.01854 mm.), whilst the average diameter of a standard sample of Belgian flax fibre was 0.00086 in. (0.02184 mm.). The retting operation, however, appeared to have been imperfectly carried out.

In 1910 further samples of flax were received which had been grown at the Government Experiment Farm at Kabete. The fibre was somewhat harsh, of a greenish grey colour, fairly lustrous and of good strength. The results of examination confirmed those previously obtained.

The results of these experiments indicated that flax can be grown successfnlly in the Highlands of the East Africa Protectorate. It is essential, however, that considerable attention should be devoted to the methods of retting (1).

Substitutes for Cotton: Kapok. — *Journal of the Royal Society of Arts*. No. 3068, p. 989. London, Sept. 8, 1911. 2392

The high prices and scarcity of cotton have encouraged German manufacturers to turn their attention to the cultivation of substitutes, among them being kapok.

The German Committee on Colonial Agriculture has sent representatives to the fibre Congress, to be held in Surabaya, Java, to study the cultivation of sisal, manila hemp (2), jute and kapok. It Germany Java

(1) See Abstr. 1743 *Bulletin*, July 1911. (*Ed.*).
(2) Cf. Abstract 1408 *Bulletin*, May 1911. (*Ed.*).

is stated that much is expected from the cultivation of kapok and calotropid, not only in the Germany colonies, but also in Mexico, Brazil, and other South American States.

The kapok crop for the current year is estimated at 70 000 bales. Herr Stark of Chemnitz has made experiments with a view to determine the possibilities of kapok, and it is said that he has succeeded in bleaching it. It is also being mixed with wool and silk waste and spun into yarn by the wool carding process. But it will be a long time before kapok, or any other substitute, plays an important part as raw material for the manufacture of goods for which cotton has hitherto been used.

2593 **Kapok and its Cultivation** (1). — *Bulletin of the Imperial Intistute*, Vol. IX, No. 2, pp. 121-123. London, 1911.

The Kapok tree, *Eriodendron anfractuosum*, occurs in the Dutch East Indies, India, Ceylon, the West Indies, Mexico and Central America.

British India. Ceylon. Java. W. Indies. Mexico, etc.

The Kapok trees grows at the sea-level and up to an altitude of 3 000 or even 4 000 feet, but gives the best yield and quality of fibre when situated at less than 2 000 feet above the sea. It is said to flourish best on a porous, loamy soil, in a climate with a dry east monsoon, and to be capable of withstanding heavy rains and resisting long periods of drought.

The propagation of the tree can be easily effected by means of either cuttings or seed. In the latter case the seed is sown in nurseries and is only lightly covered with earth. If the soil is poor, it is recommended that stable manure should be applied about 10 days before sowing. The seed should be planted in rows at a distance of 10 to 12 in. When the young plants are about 5 or 6 in. high they should be no longer shaded but exposed to the sun. If the plants do not obtain plenty of sunshine, they grow thin and lanky. The seedlings are planted out when from 8 to 12 months old. In Java, Kapok trees are commonly planted about 12 to 15 ft apart, along the roads in the coffee and cocoa plantations. When the trees are grown in special plantations, they should be placed about 18 ft. apart, for if planted more closely they soon interfere with one another. The trees commonly attain a height of 30 feet, or even more.

(1) See *Bulletin*, December 1910, p. 254; Abstr. 116, *Bull.* January 1911; Abstr. 826, *Bull.* March 1911. (*Ed.*).

Before transplanting, it is advisable to strip off all the leaves and to cut the stem down to a height of 1 ½ to 2 ft.; and also to cut the chief roots so as to make stumps of them. If the top is not cut it will usually die down to the ground. The trees subsequently require very little attention, but the soil must be kept free from weeds.

During the early years of growth other plants can be cultivated between the young trees. In Java it is a common practice to grow pepper in this way, but it should be planted before the Kapok trees are 3 or 4 years old (1).

The trees begin to bear in the third or fourth year. The crop is never very large until the sixth year. A large tree brings 1 000 to 1 500 fruits to maturity per annum, each of which contains about 0.7 to 1.2 grams of dry fibre. The tree flowers in April or May and the fruits mature and begin to open at the end of October or in November. The fruits are gathered by means of long bamboo poles bearing small hooks at the upper ends. They are then left exposed to the sun and when they are fully open the seeds are removed from the fibre by beating with sticks, or by means of a simple machine.

The number of bales (of about 80 lb. each) exported from Java in recent years is as follows: 1907, 92 874; 1908, 109 852; 1909, 87 685.

A German firm has recently discovered a method by means of which Kapok can be spun either alone or in mixture with cotton (2).

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(1) As pepper is a climbing plant, supports are used for it and generally quick growing trees, provided with a soft bark, such as Kapok, *Erythrina indica*, several species of *Albizzia* etc. HEINRICH SEMBLER, *Die Tropische Agrikultur* II. Band, p. 298. Wismar, 1900.

(2) See note on next page for the various species of *Eriodendron* which might be used for acclimatisation experiments. (*Ed.*).

2594 **Note on the Utilisation of Venezuelan Kapok Oil** (1) — *Colonie de Madagascar et Dépendances. Bulletin économique,* 10e année, N. 2, p. 263. Tananarive, 2e semestre 1910. (Printed in 1911; received the 26th August 1911).

Venezuelan Kapok Oil, which is very similar to that furnished by the seed of *Eriodendron anfractuosum* (2), might find a market as cattle feed, though up to now it has only been used in France for industrial purposes (soap making). The following analyses prove that the Venezuelan Kapok Oil cake can, in addition, be employed either as manure or for the feeding of cattle.

Venezuela

Comparative analysis of the Colombo and Venezuela Kapok Oil Cakes (3).

	Colombo %	Venezuela %
Moisture	9.80	10.00
Protein	27.81	33.68
Hydrocarbons	27.54	25.82
Fat	0.00	0.10
Ash	6.85	7.10
Fibre	28.00	23.40
	100.00	100.10

(1) The Venezuelan Kapok is probably a member of the Bombaceae, *Bombax villosum;* or perhaps a species of the genus *Chorisia,* or *Ochroma Lagopus,* which are plants indigenous to tropical America, and yield a fibre similar to that of the *Eriodendron* of Asia and Africa. See H. SEMLER, *Die Tropische Agrikultur,* Vol. III, pp. 494-495. Wismar, 1903. (*Ed.*).

(2) The species of the genus *Eriodendron,* enumerated in the *Index Kewensis,* are the following: *E. aesculifolium* D. C. (Mexic.); *anfractuosum* D. C. (Tropical Asia and Africa); *jasminiodorum* St. Hil. (Bras.); *leiantherum* D. C. (Bras.); *occidentale* G. Don (Mexic.); *pubiflorum* St. Hil. (Bras.); *phaeosanthum* Decne. (Bras.?); *Rivieri* Decne. (Bras.); *Samauma* Mart. (Bras.); *trischistandrum* A. Gray (Peruv.?); *acuminatum* S. Wats. (Mexic.); *tomentosa* Robins (Mexic.); *hypoleucum* Spruce; *grandiflorum* Conzatti (Mexic.).

(In this list synonyms have been omitted.) Cf. *Index Kewensis,* T. I, pp. 880-881; *Supplementum primum* p. 159; *Supplementum tertium* p. 70. (*Ed.*).

(3) The Bulletin supplies these figures for the analysis of the cake forming the residuum after extraction by means of sulphide of carbon. (*Ed.*).

The proportions of nitrogen, phosphoric acid and potash are as follows:

	Colombo %	Venezuela %
Nitrogen	4.45	5.39
Phosphoric acid	1.72	1.98
Potash	2.78	2.84

From the investigations just made, it is found that it would very probably be more remunerative to extract the oil without previous husking, and to keep the cake as it is for cattle food. It really does not seem that previous husking of the seeds would give the resulting oil a sufficiently large increase of value to justify this additional operation.

Henequen (1) **and Banana Cultivation in Mexico.** — *Journal of the Royal Society of Arts.* Vol. LIX, No. 3066, pp. 950-951. London, August 25, 1911. 2595

The State of Colima is peculiarly adapted for the henequen plant (*Agave rigida elongata*), which produces the sisal hemp of commerce. The foothills are generally barren of timber, and are often covered with grass, the soil being thin and sometimes rocky, but the climate and all the conditions are perfect for the cultivation of this plant. There is little labour in growing henequen, or in harvesting the crop, and the machinery necessary for the separation of the fibre from the leaves is cheap, and can be worked by the natives. It has been customary in Mexico to cultivate henequen without regard to the number of plants to an acre or to their position. The United States Consul at Manzanillo says that sometimes as many as 1 500 are put on an acre of land (about 3 700 on a hectare). The plan usually adopted is to plough and prepare about 10 acres (4 hectares) of level land, to be used as a nursery, in which the small plants are set 6 in. (15 cm.) apart in rows 2 feet (60 cm.) apart. In this manner, while the larger field is being prepared, the young plants acquire a vigorous growth. As the fields are planted, the stock from the nursery is replaced until the first ones set out produce suckers, which may be taken up and left in the sun for two or three weeks, as this makes them better and stronger. Plants in the field are set 6 ft. (1.8 metres) apart in Mexico

(1) See also Abstr. 830 *Bull.* March 1911; Abstrs, 2119-2120 *Bull.* uly, 1911. (*Ed.*).

rows 9 ft. (2.74 metres) apart. During the first 2 years, if the ground is not too rocky, it is planted with maize or beans. After this the henequen requires air and sunshine, and needs no care or cultivation. When the plant commences to mature (4th year), the leaves can be cut at any time during the dry season, and every 12 months thereafter. During the first four or five years the plant will produce from 50 to 60 " suckers ", which may be used for transplanting. The net profit from the production and sale of sisal fibre is said to be from £20 to £23 per acre (from 1235.75 to 1421.15 francs per hectare). As the henequen plant lives and produces for 15 or 20 years, without being transplanted, and is not attacked by insects or disease, and requires little expense for harvesting, it possesses a great advantage over crops which have to be planted each year.

In many districts of the State of Colima irrigation is not necessary, and banana bulbs may be set out at any time of the year. The native banana (" manzana ") will not bear transportation for any distance, and for this reason the Governor of Colima appointed a commission to inspect the " Roatán " variety, which is grown in the State of Tabasco. The commission returned with 25 000 bulbs, which were distributed amongst the farmers. The " Roatán " banana is of good size, has a thick skin, fine texture and is free from fibre and lumps, and has found favour in the American markets. The soil in which the banana is planted should be a sandy loam and when ploughed and harrowed the ground is measured in squares of 3 metres (metre = 39.3 inches), which gives about 400 plants to the acre (1000 to the hectare). When the sprouts reach the height of one foot (30 centimetres) they may be transplanted. When the land is marked into squares, a hole 3 ft. square and 3 feet deep is made, the plant being placed in the centre. The reason the bulb is planted at this depth is because of the accumulation of leaves and *débris* which forms a fertiliser and also retains the moisture. The land being set with bananas, may be planted with maize or beans, thus reducing the cost of cultivation the first year. It requires 12 months for a stock to mature and produce a bunch of fruit from the bulb. During the growth of the first stock there will come several shoots, the largest one being allowed to stand, while the others are taken up and replanted. The stock left will attain sufficient growth to produce one bunch of bananas in 4 months, or 3 bunches from one plant, or 1200 bunches per acre (about 3000 per hectare) annually. Planters receive tenpence (1.05 francs) per bunch at the plantation, and as the cost of production is £10 per acre (625 francs per hectare),

very satisfactory profits are realised. A very fine fibre is extracted from the banana stock, which is used in the manufacture of hammocks.

***Chlorocodon Whitei*. A New Fibre Plant in German East Africa.** 2596
— *The Agricultural News*, Vol. X, No. 244, p. 285. Barbados, September 2, 1911.

A new fibre plant has been found in German East Africa. This bears a fruit composed of two elongated follicles, like that of *Funtumia*, but shorter and thicker, and containing seeds with fine, silky hairs.

The plant bearing the fruit is a liana and is determined as *Chlorocodon Whitei*. Samples of the seed-hairs were sent for examination to Chemnitz, and at the same time seeds were sown for the purpose of obtaining information as to the rate of growth and yield of the plant. It has since been reported from Chemnitz that the fibre is very valuable and that a larger sample of it was required. German E. Africa

It remains to be ascertained if the plant can be cultivated profitably.

Seeds sown at Amani, German East Africa, for trial, have germinated successfully, and it is recommended that experiments with the plant should be made in other places.

Two New Brazilian Fibre-Plants, *Cavanillesia arborea* and *Bombax cyathophorum*. (1). (The Textile Fibre Industry of Brazil). — 2597
Journal of the Royal Society of Arts, Vol. LIX, No. 3064, pp. 920-921. London, August 11, 1911.

There are indigenous to Brazil, and growing wild in certain regions, two species of trees which are of interest to the commercial world because of their possibilities as producers of fibre resembling cotton and because of their occurrence in precisely those regions where it has seemed to be impossible, or at least difficult, to grow ordinary cotton. Brazil

One of these trees is called " barraguda " (2) from its peculiar barrel-shaped, trunk The tree grows from 25 to 35 feet in height;

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(1) For other Brazilian fibre plants, cf. Abstrs. 826-828, *Bulletin* March, 1911. (*Ed.*).

(2) " Barragudos " or " Barrigudos " = *Cavanillesia arborea* (W.) K. Schum. Bombaceae (A. F. W. SCHIMPER, *Pflanzengeographie auf Physiologischer Grundlage*, pp. 375 and 386, II Aufl., Jena. Fischer, 1908). (*Ed.*).

above the swollen part the trunk is very slender, branching at about 12 feet from the ground ; it is entirely covered with hard and sharp thorns. The pods in which the cotton grows are from 5 to 8 in. long, and 2 to 4 in. in diameter. The fibre is coarse and white and adheres closely to the seeds, which are somewhat smaller than peas. It is a long and strong fibre, and while too coarse for use in textiles of any degree of fineness, it would, it is said, lend itself to the fabrication of blankets, cotton twine and a variety of other materials. The habitat of this tree is in central and southern Bahia, and it grows to a less extent in the State of Pernambuco. The uplands on which it seems to flourish are from 600 to 1 000 feet above sea level.

« The other tree (1) produces a much finer cotton, of a brownish colour, exceedingly light, but not long enough to spin well, and resembles eider-down.

« The pods in which it grows are about 10 in. long and 1 ½ in. in diameter before bursting. When the pod bursts and the ripe cotton comes out, the pod takes on a rotund shape 8 to 10 in. in diameter. The fibre adheres loosely to the seeds, most of which fall out by merely shaking the pod, and is so light and fluffy that one can blow almost the entire content of a pod free from the outer enclosure or hull.

« Occasionally this cotton is used in pillows, and when properly prepared, is said to be as soft and downy as the lightest and best feathers, showing no tendency to harden with use. The inner bark of this cotton tree is utilised by the inhabitants for many purposes. It is a remarkably strong fibre, and a strip half an inch in width will, without any preparation, sustain a weight of 50 to 100 lbs. The tree has its habitat in central Bahia and northern Minas Geraes, being most abundant in the latter State, and is called " imbirussu ". Both of these trees are hardy and long-lived, 75 to 100 years being a fair average for the period during which they bear cotton fibre, while the common cotton-plant bears in many parts of Brazil for 15 to 25 years without any attention whatever. »

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(1) Imbirussu = *Bombax cyathophorum*, K. Schum. (HUASCAR PEREIRA, *Apuntamientos sobre las Madeiras del Estado de S. Paulo.* Rep. de los Estado del Brasil, Est de S. Paolo. Secret. de Agr. Comm. y O. P. Sao Paulo, 1911). (*Ed.*).

DUCKERTS (Min. belg.). **Esparto in Almeria, Spain.** — *Recueil Consulaire*, Espagne, Tome 153, 7e. livr., p. 328. Bruxelles, 1911. 2598

Esparto (1) grows spontaneously in scattered clumps in the arid mountains covering a great part of Almeria. It is much stronger than the African Esparto. Owing to this quality it fetches one pound more per ton in England. Esparto is partly used by local industries. The country people are fairly well able to plait this fibre and manufacture a number of articles: ropes, mattings, baskets, etc. Spain

Although the local consumption of this article is pretty considerable, there were exported to England last year 20 900 tons, representing a value of 206 700 pesetas (2), for the manufacture of paper.

Australian Marine Fibre. — *The Board of Trade Journal.* Vol. LXXIV, No. 768, p. 341. London, August 17, 1911. 2599

A marine fibre, known as *Posidonia australis*, is found in Spencer Gulf, South Australia. Two companies are now engaged in working the deposits. The output is stated to be at present about 10 bales a week, but one of the companies is procuring a large dredging plant, by the aid of which it is expected to obtain 50 bales a week (3). Australia

Cultivation of Sugar Beet in Europe. — *Journal of the Royal Society of Arts*, No. 3062, pp. 899-900. London, July 28, 1911. 2600

The figures given below show the areas of land growing sugar beet in Europe at the present time as compared with those under the same crop last year. Europe

(1) See Abstr. 1745 *Bull.* June 1911.

(2) peseta = 9 ½ *d.* (*Ed.*).

(3) For other notices on this fibre see *Board of Trade Journal*, December 30, 1909, p. 636.

Another species, *Posidonia oceanica* (= Caulini), is very common on the Mediterranean coasts, particularly on those of the Tyrrhenian Sea. It has been analysed with regard to its value as a manure by Prof. Fausto Sestini.

The industrial utilisation (perhaps by distillation) of these large vegetable accumulations on the shores of the Tuscan Maremma, forms an interesting economic problem. (*Ed.*).

In all these countries, with the exception of France, Belgium, Sweden and Roumania, the areas cultivated with sugar beet have increased this year. This is particularly noticeable in Russia and Italy.

	Areas in 1910		Areas in 1911	Percentage + or — in 1911
France	228 700	hectares (1)	225 373	— 1.4
Germany	473 585	»	496 837	+ 4.0
Austria-Hungary	369 700	»	397 200	+ 7.4
Belgium	66 100	»	60 800	— 8.0
Holland	49 651	»	55 744	+ 12.2
Russia	667 400	»	787 000	+ 17.9
Sweden	35 250	»	27 300	— 22.5
Denmark	22 200	»	24 000	+ 8.1
Italy	41 200	»	60 000	+ 45.6
Spain	20 000	»	20 000	—
Roumania	13 318	»	12 000	— 9.9
Servia	2 970	»	5 300	+ 78.4
Bulgaria	1 700	»	1 700	—
Switzerland	600	»	800	+ 33.3

2601 **Yield of Sugar Beets in Europe.** (Essais de Betteraves. Enquêtes des 4 et 11 Août 1911. Association internationale de statistique sucrière). — *La Sucrerie Belge*, 39e Année, No. 24, Pp. 549-553. Bruxelles 15 Août 1911.

According to the average yields of sugar beets and of sugar per unit of surface, during the last five years, the various countries **Europe** of Europe may be classed in the following order:

Countries	Beetroots per hect. Kg.	Beetroots per acre cwt.	Raw Sugar in the beets %	Raw Sugar per hect. Kg.	Raw Sugar per acre cwt.
Germany	30 060	239.57	16.33 %	4 895	39.01
Sweden	29 070	231.69	14.90 »	4 347	34.64
Belgium	28 980	230.97	14.59 »	4 232	33.63
Denmark	29 990	239.02	13.94 »	4 191	33.40
Austria Hungary	25 630	204.27	15.88 »	4 062	32.37
Holland	26 270	209.37	14.45 »	3 931	31.33
Italy	30 340	241.81	12.15 »	3 682	29.34
France	26 600	212.00	13.18 »	3 507	27.95
Spain	28 310	225.63	12.34 »	3 494	27.84
Russia	15 670	124.96	15.63 »	2 440	19.45

As for yield of beetroots, per acre, Italy stands highest, whilst Germany has the greatest yield of sugar per acre, nearly 40 cwt. or more than double the average for Russia. 2601

(1) 1 hectare = 2.47104 acres. (*Ed.*).

G. Wilbrink and F. Ledeboer. **Cross-Pollination of the Sugar-Cane.** (De geslachtilijke Voortplanting bij het Suikerriet). — *Mededeelingen van het Proefstation voor de Java Suikerindustrie*, No. 6: Abs. — *The Agricultural News*, Vol. X, No. 241, p. 227. Barbados, July 22, 1911. 2602

Information in connexion with the flower of the sugar-cane and with the methods in use in Java for producing hybrids therefrom is given in the paper under review. It is stated that the flowers of the sugar-cane require moisture to enable them to open; arrows that are at all dried up will not flower. Flowering commences when the arrow is pushed out of the sheath, an event which may occur early in the season, or later, according to circumstances. The flowers themselves commence to open early in the morning, even before sunrise, and continue to do so, in Java, until about 8 a. m. The first arrows to open are the stronger ones, while the first flowers produced on the arrow are also the most vigorous. Certain varieties of the sugar cane produce little, if any, fertile pollen; though abortion of the female organs is rare. The pollen itself consists of small yellow balls, each of which has a thick outer wall of a corky consistency and a thin inner membrane. There is an aperture in the outer wall through which the pollen tube is extruded on germination. Healthy pollen grains contain starch, a fact which is made use of in testing their fertility, in the following manner. A nearly ripe anther is opened with a needle in a solution of iodine in potassium iodide. The iodine imparts a blue colour to the starch in the pollen, if it is present. If starch is not present, the pollen is infertile. Java

Three methods for securing cross-pollination are described, in all of which a variety producing practically no fertile pollen is used as the female parent. They are as follows;

1st Method. — The two varieties to be crossed are planted in alternate rows and arrows of the male variety are bent over, so that each occupies a position a little bit above, and to windward of, an arrow of the female variety. Bent sticks are tied below the growing joints of the male arrows, to prevent their breaking by lengthening. Further, the male arrows are cut soon after they have been used, in order to preclude the contamination of the female arrows through seeds from the male arrows being blown into them.

2nd Method. — Male arrows are cut two or three days after they have commenced to flower, and are placed in a bamboo joint filled with water. The bamboo pot is then tied to the female arrow

in such a way that the male is above the female, and on the windward side.

3rd Method. — The pollen is collected on a glossy paper and subsequently it is conveyed to the stigmas of the female flowers by means of a soft brush. This method, however, has not proved very successful. When it is desired that the parentage of the seedlings shall be known with certainty, it is necessary to surround the female arrow with a screen. For the purpose, a special form of apparatus is employed, in Java, having an opening on the lee side, provided with a double over-lapping cover. The male arrow is introduced through this opening. However, some varieties do not give a good yield when fertilized within a screen.

The best method of collecting the seed has been found to be to surround the female arrow with a small muslin bag in which the seeds are allowed to ripen. All the seeds arising from one arrow are sown in pans. The seeds are pressed down on the wet sand, but are not covered; they are carefully watered in the morning and evening, and are protected with a loose covering of trash when a shower is expected. They are exposed to full sunlight from the first. If there are no results at the end of 14 days, it is certain that no fertile seeds have been produced on the arrow. In cases of success, the young plants are planted out, when 8in. high, in pots. One month later they are transplanted into the ground.

It should be noted that none of these methods is sufficiently exact for conducting hybridization work on strictly accurate Mendelian lines.

2603 WALTER LEATHER. **Sugar-Cane in India.** — *The Agricultural Journal of India*, Vol. VI, Part. III, pp. 255-266. Pusa, July, 1911.

India is importing more than half a million tons of sugar annually. Twenty years ago India purchased 100 000 tons of sugar: **ritish India** ten years ago the import had risen to 300 000 tons; now it is in excess of 600 000 tons.

The fact is all the more striking when it is recollected that India produces more sugar than any other country, the estimated production being about three million tons.

During the last twenty years the cultivated area has increased by about 21 million acres, which area has been utilised for the expansion of the wheat, cotton, oil seeds and food-grain crops; at the same time there has been no corresponding increase in the sugar-cane area which has, in fact, suffered some slight decline.

It is estimated that the cost of cultivating an acre of cane in India is about Rs, 65-80. (1) For Cuba the estimate is Rs. 100; for Louisiana, Rs. 26; for Java, Rs. 30. But if the cost in India is relatively so high, it is difficult to see how it can be reduced; and if India is to avoid her current very large sugar bill, she must increase the outturn per acre and extract a larger proportion of sugar from the cane.

Passing over the question of the efficiency of the mill as determining the amount of juice expressed in any given case, we should note that increased *production* is only to be obtained *a*) by a larger out turn of cane per acre, *b*) by the cultivation of cane yielding more sugar at the mill, and *c*) by an extension of the area under cane.

A first consideration towards the improvement of cane as a sugar producer is the cultivation of a variety most adapted to the particular locality. Nothing has been more striking in the attempt to improve the yield than the sensitiveness of newly introduced canes to novel environment.

Another means of increasing the outturn of sugar per acre is by liberal manuring. In most parts, especially the United Provinces and the Punjab, the quantity of manure employed is certainly small.

As regards a possible extension of area, there are two facts to be remembered: *a*) despite the constant increase of total cultivated area, large increase of imports, and increased price of *gur* (2), there has been a contraction of area under sugar-cane; and *b*) the sugar-cane area of India is, strange to say, almost entirely situated outside the tropics, whilst nearly all the rest of the world's cane is grown within them.

The explanation is probably twofold. Firstly, the Indo-Gangetic alluvium is a soil which possesses an unusual fertility; secondly, the facilities for cheap irrigation have been greater in the United Provinces (north of India) than in other parts.

The evidence goes to show that so long as India's chief sugar-cane area lies outside the tropics, so long will the yield per acre remain far below that of the other sugar producing countries.

(1) 1 Rupee = 1*s*. 4*d*. (*Ed.*).

(2) *Gur* or *guda*, concentrated sugar-cane juice. G. WATT. *Economic Products of India*. Vol. VI, p. 28. (*Ed.*).

2604 C. R. SCHUMACHER (British Vice-Consul). **Development of Sugar Industry and Cocoa Planting in Santo Domingo.** — *The Board of Trade Journal*, No. 762, p. 40. London, July 6, 1911.

A new company which has bought large tracts of land near La Romana is going to give out contracts for planting cane for seed purposes.

S. Domingo

It is believed that the Government is willing, if the necessary guarantees are given, to assist this new undertaking, which will work on a very large scale. The plantations near Macoris are working satisfactorily.

The state of Santo Domingo controls various tracts of land suitable for the cultivation of cocoa. For the encouragement of this industry territory is leased to planters on payment of a monetary guarantee which is returned as the land is put under cultivation. The guarantee is fixed at 2 pesos per hectare (2.47 acres) of appropriated land, and the whole concession must be worked within ten years. At the end of this period planters will pay an annual rent of 10 centavos per hectare.

There is also privately owned land suitable for growing cocoa, which can be obtained on very moderate terms (1).

2605 **The Cultivation of the Sugar Cane in Mozambique.** — *La Sucrerie Indigène et Coloniale.* Tome LXXVIII, No. 11, pp. 248-249. Paris, 12 Septembre 1911.

Sugar cane has only been planted in Mozambique for a few years past. This cultivation is undergoing rapid extension, and there are at present a number of sugar estates with factories in the districts bordering on the Zambesi and at Inhambane.

Mozambique

The total production of the last harvest amounted to about 26 000 tons of sugar, which were exported to Portugal, the British South African Colonies, England and Belgium.

The sugar produced in Mozambique is divided into four qualities: white, yellow, brown and dark brown.

There is no sugar cane in the districts of Lourenço-Marquès, Mozambique and Ibo. Nevertheless, it is announced that an English Company has been formed for the purpose of working a con-

(1) See Abstr. 1357 *Bull.* May, 1911.

For a study of plant diseases in the province of Samanà, Santo Domingo, see the report of H. JACOT DES COMBES. Republica Dominicana, *Revista de Agricultura*, Settembre, 1911. (*Ed.*).

cession of 40 000 hectares (98 844 acres) of land in the first named of these districts, on the banks of the Ambalugi. This Company will, it is stated, cover these estates with sugar cane, and expects to export the greater part of the production to Europe.

PH. EBERHARDT. **The Sesame in the Far East.** ***Sesamum indicum*** **D. C.** (1). — *L'Agriculture pratique des pays chauds.* II année, N. 98, 99, 100, pp. 353-369; 455-469 and 19-36. Paris, Mai, Juin, Juillet, 1911. **2606**

This monograph aims at proving that the cultivation of the sesame may be a highly remunerative occupation for the native in Indo-China, and that French capitalists would find it a good investment if they combined it over large areas with that of the ground nut, the castor oil plant, the cocoanut tree and the abrasin. **Indo-China British India**

Sesame is an item of considerable exportation to Europe, whence it arrives from the East, the Far East and Africa.

Eastern sesames come from Asiatic Turkey and the Persian Gulf; they are classed as the best, but the Levant only exports 15,000 tons per annum. India is the chief centre of production in the Far East, with an average of 100,000 to 150,000 tons. The sesame plant in the Far East is the *Sesamum indicum* D. C.; it grows and thrives under the most diverse conditions of soil and climate, and consequently the colour of the flowers, the width and thickness of the leaves, the colour of the seeds, and even the size of the plant itself vary with its habitat.

Sesame appears to have originated in the North of India. Starting from there it followed three great routes in its expansion. One in the direction of Ceylon as far as Java and Borneo, then towards the south and centre of Indo-China. The other, the western route, via Iran and Asia Minor and Egypt. The third towards China, whence this cultivation spread later to the North of the Indo-China Peninsula.

In British India the cultivation of sesame chiefly extends over the region from the North to the South of Agra and to Madras, comprising: the United Provinces, the Central Provinces, part of the province of Bombay, and Madras.

These are the great centres of the production and exportation of sesame. Three varieties are distinguished: the "Vel ellon", or

(1) See Watt, *Economic Products of India,* vol. VI; Pt. II; pp. 502 et seq. (*Ed.*).

white seed sesame; the " Per ellon ", with black seeds and th " Kour ellon ", with reddish brown seeds. The " Per ellon " is th species yielding the most and the best quality oil.

The different altitudes at which this plant thrives, the diversit of composition of the soil where it is grown, and the variabl hygroscopic condition of the soils in which it develops, explain th numerous varieties, and also the difficulty of laying down a genera course to be followed for cultivation in the country.

Nevertheless it has been observed that excessive rain is detri mental to the yield; that the plant suffers when exposed to over violent winds; that the lands skirting streams, lands regularly raise by warping and rather sandy, are more particularly favourable t the development of the plant. The seeds are mostly sown broadcas and sprout in eight to ten days. Flowering occurs two month after sowing, and one month later the capsules arrive at maturity The plant is harvested by cutting the stalks level with the groun and then beating out the grain.

The oil is extracted by primitive mills described by the write in his article. The crude oil cakes are used throughout India fo cattle feeding, and often, in time of famine, as food by the poor especially in the Western Provinces.

In French India sesame is cultivated as in British India, bu the white seed variety is more abundant. The production is use for local consumption and supplies an export trade of about 1 50 tons per year, to France.

In Indo-China the natives cultivate the white seed variety o the plains, and, on the mountains, the black seed variety. In th plains there is one harvest per year, the land being taken up b rice culture. In the mountains, on the contrary, there are tw harvests per year. The sowing takes place in February; the seed sprout 6 or 7 days after planting; the flowers begin to appear i May, and about the end of June the fruits have formed and ar ready to be gathered.

Beating is carried out after the stalks have been dried and th leaves removed by exposure to the sun between two pieces of mat ting, which produces a kind of fermentation, and after the direc action of the sun has burst the capsules, thus releasing the seed in most of the fruits. The oil is extracted in primitive fashion similar to the Indian method, in presses described by the author

The exportation of sesame from Indo-China to Europe is in significant. Almost the whole of the production is bought up b the Chinese, who exported it to Homg-Kong. In 1909, the export of these oils amounted to 149,283 kilogrammes. The cultivatio

of sesame in Indo-China is carried on chiefly in Cochin China, Cambodia, Annam and Tonkin.

Some considerations on the commercial production of sesame seeds, their exportation and consumption in Europe, are summed up chiefly in the observation that British India, the chief producer of sesame, is engaging more and more in the cultivation of plants having a very high yield.

On the other hand, France, which alone takes up 2/3 of the world's production, is short of raw material for its oil factories, and Indo-China is admirably equipped for this production. It is in the interests of France to develop the culture in that country, the more so because, according to the author, the Philippines are destined before another ten years have passed, to rank as a country exporting oil products.

This important work concludes with an examination from the industrial point of view of the products furnished by sesame seeds, the oil and oil cakes.

A Mc KERRAL. **Experiments with Groundnuts in the Bombay Presidency (Br. India).** — *The Agricultural Journal of India*, Vol. VI, Part III, pp. 298-299. Pusa, July, 1911. **2607**

On various farms of the Bombay Agricultural Department, experiments with the groundnut crop have been recently carried out, and some interesting results have been obtained.

To summarise the results: foreign varieties of groundnuts have been found to yield better than those indigenous, and some of them on account of their short period of growth escape the rikka disease which affects the local variety. Spanish peanut is by far the most suitable variety to grow as a dry crop in places where rainfall is scanty and the season short. For irrigated crops, *Senegal*, *Mozambique*, *Virginia* and *Pondicherry* are suitable. **British India**

Good yields are obtained by growing groundnut as a subsidiary crop to cotton sorghum or maize. Some varieties are heavier yielders than others. The heaviest yielders are not necessarily the greatest oil producers. So long however as the price continues to be indipendent of the oil percentage, the yield per acre of unhusked nuts will probably be the determining factor in deciding which variety to grow for greatest profit. Investigations as to the amount of oil in different varieties show that there is no constant relation between the percentage of oil in the seed and the variety, but that this percentage seems to be determined much more by the circum-

stances under which a particular variety is grown than by the nature of the variety itself. The results obtained have been of much practical value to cultivators, and the area under foreign groundnuts in the Bombay Presidency has shown a marked increase during the last four or five years.

Last year (1910-11) the total area under groundnut in the Presidency, including Native States, was 150 000 acres, which is 66.7 per cent. over the average of the preceding ten years. There has also been an increase in the export trade since its fall in 1904-05. Those who are interested in groundnut cultivation should consult the various farm reports of the Presidency in which the results of these experiments on varieties, manuring and cultivation, are set out in detail.

2608 **Ground nuts in Mozambique.** (French Consular Report). — *Feuille d'Information du Ministère de l'Agriculture*, N. 35, p. 4. Paris, 5 Septembre 1911.

Mozambique

The results of the Ground nut harvests of the districts of Inhambane, Beira and Ibo are as follows:

Inhambane exported 921 tons, Beira 1755 and Ibo 1286. The principal buyers are the Portuguese Colonies, Germany, France and Holland.

2609 HENRY JUMELLE and H. PERRIER DE LA BATHIE. **The Oil Palm of Madagascar.** — *Colonie de Madagascar et Dépendances. Bulletin économique*, 10e année, No. 2, pp. 174-178. Tananarive, 2e semestre 1910. (Received August 1911).

Madagascar

The Oil Palm (*Elaeis guineensis*) (1) grows spontaneously in Madagascar. The indigenous character of this plant is proved by the fact that the *Elaeis* of Madagascar presents the features of the wild forms of *Elaeis* on the African Continent, and by the fact that it has a very definite distribution there.

On the west coast of the island the palm is, in point of fact, not found everywhere, but belongs to a well defined zone. If, starting from the south of the Ambongo, we descend along this western coast, it appears at the level which marks the disappearance of the *Raphia*, on the Ranobe and the Manambaho, where the two

(1) See page 259 *Bulletin* December 1910; Abs. 460-461, *Bulletin* February 1911; and above, Abs. 2413. (*Ed.*).

palm trees are still found. Further down, however, the *Elaeis* has completely replaced the *Raphia* in the lower basins of the Manambolo and the Tsiribihina. Still lower, in the Mangoka and in the south, the *Elaeis* itself disappears in turn.

While the *Elaeis* of the African Continent, though partial to cool soils impregnated with moisture, is never found in places where water stagnates (that is to say, the very place where the *Raphia* thrives), the Madagascar *Elaeis* grows in half marshy soils, and its station is that of the *Raphia ruffia* (1).

Like the varieties of West Africa, the Madagascar Palm is ill able to withstand the brushwood fires. Each tree can carry from 6 to 20 inflorescences, some male, others female. The fruit cluster may weigh from 5 to 10 kilos. The average weight of the dried fruit is 2.20 grammes. The pulp of these fruits is 2 mm. thick at most, and represents about 25 % of the total weight ; the kernels represent 21 % and the stones 54 %.

In spite of the number of its inflorescences, the Madagascar *Elaeis* does not seem very productive. The Sakalavas of Tsiribihina sometimes, though not often, extract the oil from the fruit. They more usually eat its terminal bud, or prepare an excellent palm wine.

Commercially the culture of the wild palm tree of Madagascar cannot be thought of ; its productivity is too low, its fruit is too small and its pulp too thin. The presencc of the *Elaeis* in the West of Madagascar, however, proves that there is, in this part of the island, a region where improved varieties might be introduced and thrive.

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(1) This Palm tree is common in the coast regions, very common in the middle zone and very rare in the upper zone of Madagascar. Nevertheless its textile fibres are sold under the name of « Rafia » at all the fairs of Imerina and Betsileo. With the prepared leaves, ropes, matting, hats, basket work, fabrics, and even garments of mixed texture, known under the name of « Rabanes », excellent in use, are made. The ovoid fruit, covered with shiny scales, contains a dark yellow pulp, thin and eatable. On making an incision into the spathes of « Rafia » a plentiful and agreeable liquor is obtained, the palm tree wine known as « Harafa » or « Arafa » in Madagascar.

(E. HECKEL, *Les Plantes utiles de Madagascar*, pp. 179-180. Marseille-Paris, 1910). (*Ed.*).

2610 **World's Production of Castor Seed.** — *The Journal of the Jamaica Agricultural Society.* Vol. XV, No. 7, pp. 296-303. Kingston, July, 1911.

India is the principal castor seed producing country, and the bulk of the supply of castor seed that enters international trade is drawn from this source. The Indian exports of castor oil also exceed those of any other country. Although the actual production of this crop is not shown in the statistical returns for India, the following tables, showing the amounts exported, will indicate the magnitude of the trade in this commodity.

British India
United States
Brazil

Exports from India during 1908-09.

	Castor seed		Castor oil	
	kg.	cwts.	litres	gall.
United Kingdom	40 507 585	806 789	596 592	131 308
France	16 467 547	333 959	—	—
Belgium	10 397 808	207 093	—	—
Italy	8 847 875	176 223	—	—
Germany	5 502 991	109 603	—	—
Ceylon	—	—	290 690	63 980
Straits settlements	—	—	803 392	176 824
Hong Kong	—	—	61 487	13 533
Cape Colony	—	—	41 205	9 069
Natal	—	—	334 807	73 690
Mauritius	—	—	378 988	83 414
New Zealand	—	—	758 717	166 718
Australia	—	—	1 603 118	352 841

The cultivation of castor seed in the United States is confined chiefly to a few districts in Oklahoma, Eastern Kansas, West Illinois.

The amount of the annual crop is not given in the returns but it is estimated to be under 100 000 bushels. Although not native to Brazil, the castor plant finds in that country a suitable soil and climate, and has become naturalised to a large extent. The consumption of castor oil in Brazil is large, and there are a number of castor oil factories, mainly in the State of Pernambuco (1).

(1) See Abstr. 1751 *Bull.* June 1911 (*Ed.*).

P. G. Fourier. **Castor Oil Seed culture in South Africa.** — See below, Abstr. 2632. 2611

Al. Hébert. **Karité fats.** ***(Butyrospermum Parckii)*** (1). — *La Quinzaine coloniale*, XV année, N. 16, p. 572. Paris, 25 Août 1911. 2612

The analytical results obtained by the author show that the roasting of the kernels causes no noteworthy change from the point of view of the yield of fats and the constants of the latter. The method of A. Martin and Co. likewise produces no important modification; there is only a slight reduction of acidity to record. The analysis of the seeds dried in the sun and not roasted, taken as standards, gives the following results: **France**

Average weight of a kernel	Gr.	5.5
Percentage yield of fat	»	23
Moisture of kernels	»	13.5
Melting point of the fat	»	+ 27°
Density at melting point	»	9.911
Acidity index	»	5.6
Reichert »	»	2.4
Hehner »	»	93.9
Saponification»	»	188.6
Iodine »	»	62.2
Melting point of fatty acids	»	+ 23°

G. Grimme. **Oil from the Seeds of *Xanthophyllum lanceolatum*.** (1) (*Chem. Rev. Fett- u. Harz-Ind.*, 1911, 18, 125-126). — *The Analyst*, Vol. XXXVI, No. 425, p. 406. London, August, 1911. 2613

The seeds produced by *Xanthophyllum lanceolatum*, a tree belonging to the Polygalaceae, yield a fat which is extensively used as food by the natives of Singapore. A sample of the seeds examined **Straits Settlements: Singapore**

(1) Cf. *Bulletin*, November 1910, p. 78; Abs 835 *Bulletin* March, 1911. (*Ed.*).

(1) This species is not mentioned in the *Index Kewensis*, nor in the three supplements hitherto issued.

by the writer yielded 39.17 per cent. of a fat having the following characteristics :

Fat.

Sp. Gr. at 50° C.	Melting Point	Solidification Point	(N) D 40 °C	Acid Value	Saponification Value	Iodine Value	Hehner Value	Glycerol	Unsaponifiable Matter
	C°	C°						%	%
0.9021	44.0	41.5	1.4549	52.06	189.5	38.9	98.85	6.41	1.37

Faty acids.

Melting Point	Solidification Point	(N) D 55 °C	Iodine Value	Mean Molecular Weight	Neutralisation Value
C°					
55	53.5	1.4424	38.2	268.3	207.3

The fat was not toxic, but the press-cake contained a poisonous saponin, which would render it unsuitable for a feeding-stuff.

2614 I. CLAESSENS. **Boleko seeds**. (Graines de Boleko). — *Bulletin Agricole du Congo Belge*, Vol. II, No. 2, pp. 203-206. Bruxelles. Juin, 1911.

Mr. Claessens recently brought with him from the Congo some fatty seeds, called, like the plant which produces them, « Boleko », by the natives of the district of the Equator. Boleko is a tree present in large numbers in the equatorial forests; its trunk is cylindrical and may attain 2 metres in circumference. At the time of fructification, the fruits, which are drupes, are strewn over the ground in large quantities; the fresh exocarpus ferments rapidly and gives forth a characteristic acid smell.

Belgian Congo

When fresh, the Boleko is eatable, but according to the natives it is advisable not to eat more than seven, as one would run the risk of colic.

The Batetela women extract oil from it which they use for toilet purposes. The chief point of interest of the Boleko, how

is the oleaginous value of its seed ; the following is an analysis due to Messrs Lever Brothers :

Oil	52.57
Albuminoids	19.82
Cellulose	3.00
Hydrocarbons	17.72
Ash	3.24
Moisture	3.65
	100.00

Soap from the oil extracted : reddish brown.
Analysis of the fatty acids :

Iodine index	81.85
Density	0.9317
Melting point	20° C.

The percentage of albuminoids in the Boleko oil cake is said to be 33 %, which is lower than that contained in the flour of husked cotton seed ; nevertheless the oil cake would be very useful for cattle feeding, if it did not contain poisonous substances.

The oil resembles castor oil ; it seems for that matter to contain a large percentage of ricinoleic acid.

If it is found that Boleko seed is not poisonous, its value will be greater than that of the castor oil plant seeds ; if it is poisonous; it is probably not so valuable as these latter seeds, which can be obtained in large quantities.

According to the description given by Professor Heckel the Boleko is none other than the *Onguekoa Gore* (Engler), of the family of the Olinieae, or at any rate a very near species (1).

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(1) See, Ed. Heckel, *Les graines grasses*, p. 67-72; Paris, 1902. The name is given as *Onguekoa Gore* Pierre in the *Index Kewensis* (Suppl. II), as a synonym of *O. Klaineana* Pierre, and the plant is placed among the Olacaceae. The latter classification has been accepted by Th. Vau Tieghem, *Elements de Botanique*, II, p. 366, 4e Édit. Paris, 1906. (*Ed.*).

2615 HENRI JUMELLE AND M. PERRIER DE LA BATHIE. **A Madagascar Euphorbiaceous Plant (*Jatropha mahafalensis*).** — *Colonie de Madagascar et Dépendances. Bulletin économique* 10e année, No. 2, pp. 179-180. Tananarive, 2e semestre 1910, (received 24 August 1911).

Magascar

The colonisation department of Madagascar is at the present moment studying the oil seeds of a small tree which is common in the South-West of Madagascar, on the limestone plains of Mahafaly and Bara, and which furthermore seems to occur throughout the South of the island. The Mahafaly are able to utilise this oil.

The plant in question is the " Betratra " of the natives. The writers call it (until a fuller description can be given) *Jatropha mahafalensis* (1). It is a tree 5 to 6 metres high, often putting out branches from the very base. The trunk is slightly bulged a little way above the ground ; it has a smooth bark and contains an abundant colourless juice.

The leaves are glabrous, with long petioles, and trilobate. The short branches which carry the leaves terminate in the inflorescences. The plant is dioecious.

2616 **New Congo Oil Seed, *Marmiophytum fulvum* Müll** (2). — *La Quinzaine coloniale*, XV Année, No. 15, p. 340. Paris, 10 Août 1911.

French Congo

M. Ed. Heckel has received from the province of Likoala, French Congo, fruits and seeds. The latter, known as " Casso " in the country, also bear the names of " N'Kam " in Bondjo, " Gasso " in Yakoma and " Ekoun " in Pahouin.

The original plant is said to belong to the Euphorbiaceae, *Marmiophytum fulvum* Müll. Arg., a dioecious climbing shrub already known, except for the fruit and seed. The fruit is a strong capsule or shell with several compartments, reduced sometimes to two or one ; the number of seeds is equal to that of the compartments, their integument is light yellow in colour with veined surface and whitish inside ; the inner part of the integument, whitish and shaggy, adheres firmly to the kernel. The average weight of the seed, freed of its envelopes, is 5 to 7 grammes and represents

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(1) *Jatropha mahafalensis* is not named in the Index Kewensis, including Suppl. III. (*Ed.*).

(2) The genus *Marmiophytum* is not mentioned in the Index Kewensis nor in its supplements up to 1908. (*Ed.*).

66 % of the gross weight ; it yields 51.30 % of oil when treated with sulphide of carbon. This fatty substance is liquid at ordinary temperatures, a clear yellow, without odour or marked taste, and dries rapidly. The density at + 15° = 0.997 ; iodine index = 101, yield of saponifiable fatty acids 95.60 %, and solidifying point of these acids = 14° ; saponification index = 187.6.

This oil is doubtless more or less toxic, but it could find a sure market in the painting industry.

A. HÉBERT. **Composition of Various Oil Seeds from French West Africa**. — *La Quinzaine Coloniale*, XV Année, No. 15, p. 541. Paris, Août 1911. 2617

The *Dumoria Heckeli*, one of the Sapotaceae, yields " Doumori butter," which supplies the natives of the Ivory Coast with a fat melting only at a high temperature and possessing food properties. Its characteristics are as follows :

French West Africa

Yield of husked seed	40 %
Density at + 15° C.	0.956
Melting point	+ 34°
Acidity index	5.6
Saponification index	188
Iodine index	56.4
Melting point of fatty acids	+ 60°

The fatty acids are : oleic acid, carnaubic or cerotic acid and stearic and palmitic acids.

In a table (*Matières grasses* 1911, No. 35, p. 2159) the Author has collected the physical constants of various other fatty substances extracted from the seeds of *Chrysophyllum africanum*, *Omphalocarpum anocentrum* (Sapotaceae), *Carapa microcarpa* (Meliaceae), *Balanites Tieghemii* (Simarubaceae), *Ricinodendron africanum* (Euphorbiaceae), *Saccoglotis gabonensis* (Humiriaceae), *Pentadesma butyraceum* (Clusiaceae).

The fatty substance of *Carapa* (1) is known under the name of Kobi butter on the Ivory Coast. Its density is low: 0.895, and it melts at + 16°. C. It contains chiefly olein, which justifies its use by the natives for the manufacture of soap. *Pentadesma*

(1) According to C. WEHMER *Die Pflanzenstoffe* (Jena, 1911), pp. 418-419, quoting Heckel, *Carapa procera* D. C., yields Tulucuna fat, which is solid, while *C. guianensis* Aubl. gives Carapa oil, which is liquid at ordinary temperatures. (*Ed*).

furnishes the fatty substances of Kanya or Lamy butter, the composition of which is said to approximate to that of tallows, and to make it a substitute for natural fatty substances; it melts at + 32° C. and the solid fatty acids are said to be palmitic and stearic acids.

2618 G. MUNDY. **The Possibilities of an Export Trade in Oil Seeds from Rhodesia.** — *The Rhodesia Agricult. Journal.* No. 5, pp. 686-691. Salisbury, June, 1911.

Several enquiries have recently reached the agricultural office regarding the possibilities of finding a market for Rhodesian grown linseed and ground nuts. During the past season local supplies have been totally inadequate to meet local demand, and large quantities of nuts have been imported from Portuguese territory.

Rhodesia

Several varieties of soy beans have been under trial at the Botanical Experimental Station, Salisbury, during the last two seasons, and while some have failed entirely, others have done moderately well, and better results may he expected next season from acclimatised and selected seed. The growing of linseed is rapidly gaining ground in Rhodesia, a sure indication that it thrives well. As a matter of fact, on suitable land, it is a very reliable crop. (1).

2619 **The Production of Coffee in British India.** (Die Kaffeeproduktion Britisch-Indien). — *Das Handels- Museum*, No. 23, p. 356. Wien, 8 Juni 1911.

Coffee growing in India is in continual decline. During the last five years the quantities exported were respectively 36, 17, 37, 23 and 33 million pounds (16.3, 7.7, 16.7, 10.4 and 14.9 million kilogrammes).

British India

A good deal of coffee goes to Arabia, to leave that country afterwards under the description of pure Moka. The principal cause of the decline of coffee cultivation in India is the fall in prices. Coffee is only cultivated in Southern India; the production of Burma, Assam and Bombay is very small. Even in the South, the culture is not regularly distributed from the point of view of intensity, but it is carried out principally in the districts of Mysore, Coorg, Malabar and the Nilghiris.

The area under coffee, which was 283 000 acres (114 615 hectares) in 1895, was 203 000 (82 215 hectares) in 1909-10.

(1) See the *Journal of the Royal Society of Arts* 1911 on the insufficient production of linseed oil in the world. (*Ed.*).

In 1895, the production had been 40 071 000 lbs. (18 152 163 kg.); in 1909 it was only 34 383 000 lbs. (15 847 299 kg.). In 1895 there had been exported 32 191 000 lbs. (14 582 523 kg.); in 1908 the exports were only 23 625 000 lbs. (10 702 125 klg.); the greater part of this exportation went to England and France.(1).

Production of Coffee in Java. — See above, Abstr. 2400. 2620

ALFRED A. WINSLOW. (Consul at Valparaiso). **Tea and Coffee in Chile.** — *American Grocer.* Vol. LXXXV, No. 21, p. 12. New York, May 24, 1911. 2621

The quantities of tea, coffee and yerba maté consumed in Chile are shown in the following table: Chile

	Tea lbs.	Coffee lbs.	Yerba maté lbs.
1906	2 845 546	6 969 259	8 944 408
1907	2 329 239	5 938 592	8 925 444
1908	2 829 382	5 773 493	5 377 955
1909	2 752 279	8 541 863	7 788 242
1910	3 343 789	9 250 736	9 287 806

Ecuador supplies about 50 cent. of the coffee, Brazil 21 per cent., Guatemala 6 per cent. and the balance various countries. Brazil supplies 45 per cent. of the yerba maté, and Uruguay about 37 per cent. England supplies 89 per cent of the tea and Germany 8 per cent.

A. A. BESSON. **Valuation of Tea.** (Chem. Zeit, 1911, 35, 813-815; 830-832). — Abs. *The Analyst,* Vol. XXXVI. No 426, p. 454. Sept. 1911, London. 2622

Mr Besson has analysed and examined some ninety samples of teas, of which forty-three were Chinese teas and the remainder Ceylon, Java, and Indian products. Particular attention was paid to the China Ceylon Java British India

(1) In 1909-10, the coffee exports of British India were valued at 10 964 037 Rupees (fr 12 690 661). *Statesman's Year Book for* 1911. p. 145 (1 Rupee = 1 s. 4 d). (*Ed*).

proportion of stalk in the samples, but it was found that there was very little relation between the amount of stalk and the price and quality of a tea as shown by a tasting test. It was ascertained, however, that Java tea grown at an altitude of 4 500 feet was of distinctly better quality than that grown at 1 800 feet.

2623 HENRY DURAND. **The Tea Flower.** — *Revue Scientifique.* 4e Année, 2e Semestre, No. 4, pp. VIII. Paris, 22 Juillet 1911.

Ceylon
China

The use of tea has, during the past few years, become almost general in France. Not so well known, however, is the use of the tea flower in the same way as the leaf. The infusion of this flower is very sweet and aromatic. It possesses the same hygienic and stimulating properties as the infusion of leaves.

From the point of view of the crop, preparation, and prevention of adulteration, the flower presents valuable advantages. The process of gathering the leaves is extremely difficult and elaborate. They must not be torn off in handfuls, they must be detached one by one with the utmost care. This operation is rather expensive, above all when the plantation is young or has been recently cut, because the workman is obliged to pass over a greater extent of land in order to gather the same quantity of leaves. Harvesting the flowers is a much more simple process, and should be done a few days before the buds open ; in any case it causes no injury whatever to the plant.

The preparation and manipulation of the leaves with the successive phases, both lengthy and delicate, through which they must go, are done away with in the case of the flowers. There is no longer any necessity for roasting or drying in the open air, no rolling of the leaves either by hand or by machine, but only drying by some process or other.

The principal quality of the flower is the difficulty which it offers to adulteration. With the leaves, frauds are innumerable. When the flower of the tea plant is in question, on the contrary, fraud becomes extremely easy to detect, because the difference between flowers of different plants is obvious to the least experienced eye, while it is a frequent thing to mistake leaves when they have been submitted to a series of operations which have finally altered their original form and given them an almost identical appearance.

The methods of using the tea flower are the same as those of the tea leaf. (1).

The World's Output of Cocoa in 1908 and 1909. — *Revue scientifique*, 29e année, No 11, p. 346. Paris, 9 Septembre 1911. 2624

During the ten years, period from 1899 - 1909 the total production of cocoa rose from 99 886 649 kilogrammes to 204 660 000 kilogrammes ; therefore it more than doubled, showing an average annual increase of 10 000 tons.

Brazil continues to lead the producing countries with 33 730 tons in 1909, being an excess of 770 tons over 1908. The exports of that country are made up in very great part of Bahia produce, which in 1909 totalled 28 783 080 kilogrammes. After Brazil come : Equator (30 650 tons in 1909), Trinidad (23 260 tons), Venezuela (16 890 tons), San Domingo (14 820 tons), etc.

Brazil
Ecuador
Trinidad
Venezuela
S. Domingo
S. Thomé
Kamerun

The American group produced in 1909, 137 260 tons, as against 137 070 tons in 1908.

The harvests in San Thomé continue to progress (28 560 tons in 1908, and 29 620 in 1909) and they furnish a cocoa which is more and more appreciated.

The vigorous impulse given to the cultivation of cocoa in the British West African Possessions finds expression in a considerable increase of the exports (14 260 tons in 1908 and 22 470 in 1909). There is no certainty, however, that this remarkable progress will be continued for any long time to come, owing to the want of care in native cultivations.

The progress made by the German Colonies is very appreciable. The German output rose from 2 740 tons in 1908, to 3 400 tons in 1909, 2 800 tons coming from Kamerun. The African group produced in all 48 440 tons in 1908 and 56 860 tons in 1909.

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(1) C. HARTWICH, *Die Menschlichen Genussmittel*, Leipzig 1911, and also WYNTER BLYTH, *Foods: Their Composition and Analysis*, Sixth Ed., London 1909, while dealing with tea in detail do not refer to the tea flower.

On the other hand H. NEUVILLE, *Technologie du thé*, Paris 1905, pp. 67-68, says: " the tea flower is capable of the same use as the leaves. Prepared like the latter. it can be employed for making very pleasant and fragrant infusions which possess the feature of being almost free from thein. The tea flower contains very little alkaloid, and this property should be turnedto account when the flavour of tea is desired without the exciting action of the infusion prepared with the leaves. This flower is the source of a fairly considerable trade in Tonking and has been recently introduced into France. (*Ed.*).

2625 JOHN HINCHLEY HART. **Cacao**. (London, Duckworth & Co.). Abs. — *Journal of the Royal Society of Arts*, Vol. LIX, No. 3066, p. 957. London, August 25, 1911.

Starting with a chapter on botany and nomenclature, the writer proceeds to deal with the question of selection of land, nurseries, planting of cacao, manuring, pruning, diseases and pests, and picking and harvesting; he then describes at length the operations for drying, etc., and the apparatus required therefor, and discusses generally the management of a cacao estate.

Ecuador. San Thomé. Tinidad. British W. Africa

The following figures will be sufficient to indicate the great extent of the cacao industry: The world's production of cacao for the year 1910 is estimated at 478 800 000 lbs; Ecuador comes first, with 84 600 000 lbs (1), San Thomé second, with 80 500 000 lbs.; and Trinidad third, with 67 500 000 lbs. Of British Colonies (with a grand total of 138 500 000 lbs.), Trinidad is easily first, British West Africa ranking second with 55 200 000 lbs.).

The remarkable increase in the export of Trinidad cacao is doubtless due in no small measure to Mr. Hart, who was chief of the botanical department in Trinidad in 1887, and for many years superintendent of the Royal Botanical Gardens in Trinidad. In 1901 the quantity exported from Trinidad was 16 188 493 lbs., valued at £ 439 786; this rose steadily till in 1908-9 the figures were 49 137 088 lbs., valued at £ 1 152 285(2).

2626 **The Germination of Maté Seeds**. — *La Nature*, 39e Année, No. 1991, p. 127. Paris, 22 Juillet 1911.

M. Charles Thays, General Conservator of Public Promenades and Director of the Botanical Garden of Buenos Ayres, has contrived a method of cultivation of maté, *Ilex paraguayensis*, which having been adopted after conclusive tests by a large number of Argentine planters, has proved very effective. It consists simply in steeping the seeds in water heated to 80° C. and renewed every six hours, for a period of four days. In this way the integuments of the seed are sufficiently softened, so that of one hundred seeds planted

Argentina

(1) In 1909 the exportation of Cacao from Ecuador amounted to 70 433 967 lbs. The Germans are developing the cultivation of Cacao in Ecuador more and more. *The Statesman's Year Book for 1911* p. 742.

(2) In 1909-10 the acreage under cacao in Trinidad was 245 706 acres. This cultivation is also being developed in the island of Tobago. *Ibidem*, p. 269. (*Ed.*.)

in the soil from 40 to 60 germinate. According to the observations of M. Thays, trees springing from seeds scalded in this way straightway produce seeds capable of germinating without any special preparation.

M. Thays' discovery possesses great practical interest and cannot fail to modify the conditions of production of maté : the period in which only plants that have sprung up spontaneously in forests are harvested, will be succeeded by the period of cultivated plants. Such transformations always benefit both the producer and the consumer both as regards yield, price and quality.

Paraguay Tea or « Yerba Maté » ***(Ilex paraguayensis).*** — *Pure Products,* Vol. VII, No. 8. New York, August, 1911. 2627

Chemical analysis, made in the laboratory of the Scientific Station for Pure Products, showed that maté was found to possess a composition analogous to tea. The per cent of thein (the vegetable alkaloid present) was about one-half that found in tea. The amount of tannin, extracted in the ordinary mode of preparation by infusion, was about two thirds that extracted from tea under similar conditions. Paraguay

The aromatic substances, essential oils, etc., were much greater than in tea. (1) The following are two analyses of maté:

	I	II
Moisture	6.45	6.50
Ash	5.84	5.85
Tannin	13.72	13.51
Thein	1.40	1.40
Sugars	None	None
Fat (petroleum ether extract)	5.30	5.32
Water extract	33.35	33.50
Fibre, insoluble matter etc.	66.65	66.50

The ash consisted of 3.36 per cent insoluble and 2.48 per cent soluble matter. The alkalinity of the ash was 53 cc. $N/_{10}$ H_2SO_4 per one gram of the ash. The mineral constituents of the maté are particularly rich in manganese, a substance of well known therapeutic value.

(1) See this *Bulletin* Jan. 1911 Abstr. 133. (*Ed.*).

The ash of tea contains small amounts of manganese and the ash of coffee none, or only traces. The following figures give comparisons of the average chemical composition of maté and of tea:

Constituent	Maté	Tea
Thein	0.3 % to 1.85 %	0.98 % to 4.85 %
Tannin	5.0 » » 14.0 »	8.0 » » 21.0 »
Fat (petroleum ether extract)	2.0 » » 6.0 »	5.0 » » 22.0 »
Water extract	30.0 » » 42.0 »	30.0 » » 55.0 »
Ash	3.92 » » 6.95 »	2.38 » » 5.11 »

2628 **The World's Tobacco Consumption.** — *The Tropical Agriculturist*, Vol. XXXVI, No. 6, pp. 492-493. Colombo, June, 1911.

According to a Report issued by the Department of Commerce and Labour, based on the report of the tobacco experts of London, the total consumption of tobacco in the world is estimated at 1 883 399 548 pounds.

The amount of tobacco consumed per person per year in the various states is as follows:

	lbs.
Netherlands	7.5
Belgium	6.2
United States	5.7
Cuba	5.1
Switzerland	4.7
Denmark	4.6
Argentina	4
Germany	3.5
Sweden	3.4
Austria	3
Great Britain	2

The Report shows that where taxation presses most lightly the consumption per head is highest. In England the amount of taxation is the highest in the world per person (*7 s 3 d*), and the Consumption of tobacco per head is the lowest — 2 lbs.

The world's production of tobacco in 1909 is given as 1 861 414 648 lbs, distributed as follows:

	lbs.
United States	939 357 000
Russia	207 417 000
Hungary	143 477 000
Japan	91 327 000
Ottoman Empire	76 555 000
Germany	62 104 000
France	50 987 000 (1)

2629

ABBATE. **Experiments in cultivating Tobacco of the Herzegovina Variety in Comiso, Sicily, Italy.** (Relazione riguardante la coltivazione in esperimento della varietà Erzegovina eseguita nell'Agenzia di Comiso nella Campagna 1911). — *Bollettino Tecnico della Coltivazione dei Tabacchi*, Anno X, No. 3, p. 161. Scafati, Maggio-Giugno, 1911.

Italy : Sicily

These experiments were carried out on argilo-calcareous, and silico-calcareous soils and loams. The soil was prepared and manured in November with sheep droppings, in the proportion of 100 quintals per hectare (4 tons per acre). The seeds were sown from the first fortnight in November until early in January. Germination occurred after about 25 days. The harvest began in the first fortnight in June and ended about the beginning of September.

The experiment gave fairly good results, above all in the Renelle locality, where the light, sandy, silicious soil yielded a very delicate tobacco of a fine golden-yellow colour, the flavour of which should be further improved by greater care during the maturing process.

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(1) In Italy between 1903 and 1907 the average tobacco area was 12 353 ac., with an average yield of 14 211 000 lbs. of leaves (*Inst. Int. d'Agric. "Statistique des Superficies Cultivées, de la Production végétale et du Bétail dans les Pays adhérents*, p. 44).

In Italy the consumption of tobacco per head during 1893 was 1.23 lb.; since then it has steadily fallen to 1.07 lb. between 1901 and 1906.

(*Ed.*).

2630 **Tobacco Situation in the United States, July, 1911.** — *American Grocer*; Vol. LXXXVI, No. 7, p. 14. New York, 16 August, 1911.

The 1911 area of cigar-leaf tobacco is 154 200 acres, against 146 200 in 1910, an increase of 8000 acres or 5.6 per cent. The highest condition (100 per cent) is reported in Wisconsin, while the lowest (85 per cent) is in the Miami Valley, Ohio.

United States

The average condition for the cigar-leaf territory is 92 per cent, which in connection with the increased acreage, indicates a larger production than last year.

In the districts where chewing, smoking, snuff, and export tobaccos are cultivated, the area is 730 600 acres, compared with 1 070 100 last year, a decrease of 339 500 acres, or 31.7 per cent.

In only two districts, the upper Green River of Kentucky, and the Perique of Louisiana has the extent planted equalled that of last year.

Only Perique covers the full intended area (1).

2631 **The Future of Tobacco in the Belgian Congo.** — *Le Tabac*, 31e Année, No. 494, p. 3. Paris, 6 Août 1911.

The Congo is astride of the Equator in a geographical position analogous to that of Sumatra, Java and Brazil. The analogy between these different, countries however, should be carried much

(1) In 1910 there were in the United States, under tobacco 1 233 800 acres, which yielded 984 000 lbs. of tobacco, valued at 91 458 773 dollars. The chief tobacco-growing States were Kentucky, 470 400 acres, yielding 381 024 000 lbs.; Virginia, 160 000 acres, yielding 124 800 000 lbs.; Ohio, 92 700 acres, yielding 75 087 000 lbs.; North Carolina, 216 000 acres, yielding 129 600 000 lbs.; Wisconsin, 30 200 acres, yielding 31 710 000 lbs.; Pennsylvania, 33 000 acres, yielding 49 500 000 lbs.; Tennessee, 85 000 acres, yielding 64 600 000 lbs.; Connecticut, 13 400 acres, yielding 23 182 000 lbs; Maryland, 28 500 acres, yielding 19 665 000 lbs.; Indiana, 27 000 acres, yielding 23 760 000 lbs.; South Carolina, 30 000 acres, yielding 18 900 000 lbs.; New York, 5 900 acres, yielding 7 375 000 lbs.; Massachusetts, 4 400 acres, yielding 7 612 000 lbs. In 1905 for the manufacture of cigars and cigarettes there were 16 395 establishments employing 142 547 persons (salaried and wage-earning); the capital employed was 145 135 945 dollars; the cost of raw material used in the year was 81 134 561 dollars, and the value of the output was 214 350 051 dollars. For the manufacture of tobacco (chewing and smoking) and snuff, there were 433 establishments employing 26 097 persons; the capital employed was 178 847 556 dollars; the cost of raw material used in the year was 44 954 047 dollars, and the value of output, 116 767 630 dollars.

The Statesman's Year-Book for 1911, p. 378. (*Ed.*).

arther. Like the State of Bahia in Brazil and the tobacco cultiv-tion lands in Sumatra, the Congo is, in its greater part, a low plain raversed by majestic streams. The resemblance of the climate average temperatures, rain-fall and air moisture) is quite as striking.

For this cultivation there is required. on the other hand, sandy oil rich in humus. Now the Congo is made up of soils which are, t is true, quite recent, but on which the luxuriant vegetation of the ropics has rapidly accumulated the necessary humus.

The Congo soil therefore seems perfectly satisfactory for the ultivation of tobacco, and possesses in sufficient measure the pro-perties this cultivation demands.

P. J. Fourie. **Tobacco, Cotton, and Castor Oil Culture in South Africa.** — *Journal of the Royal Society of Arts.* Vol. LIX, No. 3067, pp. 973-974. London, Sept. 1, 1911. **2632**

A few years ago, the writer experimentally undertook tobacco culture in the Transvaal and in the Orange River Colony. The size of the plants and of the leaves, and the quality of the tobacco, proved highly satisfactory, and the aroma and flavour were excellent. The following year he extended operations to prove the profits of tobacco culture, with the result that the demand for the locally-grown tobacco far exceeded the supply. A number of farmers are planting this season, which is encouraging. The writer is now experimenting with the Turkish cigar variety and Brazilian tobaccos. Unfortunately, however, skilled labour is wanting, and fermentation and the curing of the leaves are imperfectly understood. **S. African Union**

Last year, the writer planted the following kinds of cotton: — Barbadoes, St. Vincent, Egyptian Abbassi, and American Rattler. The plants grew well and the bolls, with a fine fibre lint, were large and well developed. Cotton cultivation in South Africa should be encouraged. The East London Chamber of Commerce is taking the matter in hand.

In the mines and elsewhere in the Union, there is practically an unlimited demand for castor oil. The writer experimented on the cultivation of the castor bean and planted the Italian and the colonial kinds. Both grew well and yielded beyond expectations. Under irrigation nothing more profitable can be cultivated, but as such lands are limited and largely required for lucerne and cereal cultivation, the writer experimented under conditions approaching those of dry lands, with satisfactory results. He most strenuously

advocates the cultivation of the castor bean on dry lands, that is ground lying idle and useless at present, of which there are millions of acres.

2633 **Tobacco Growing in Cape Colony.** (Tabakbau in der Kapprovinz). — *Deutsches Kolonialblatt.* No. 18, p. 670. Berlin, 15 September, 1911.

S. African Union: Cape Colony

For the second time, native tobacco, in considerably greater quantity than in the preceding year, has been put up for sale. In 1910, 4160 pounds of Turkish tobacco produced in the country and 2990 pounds of Virginia came on the market, while this year 17 259 pounds of the former and 3 298 of the latter were sold. The environs of Slang Rivier, French Hoek, Wellington, Stellenbosch, Tulbagh, Calais and Blotenborg, are particularly well adapted for this culture (1).

In view of the great demand for consumption within the country, the prospects for local growers are excellent. The surplus production might then be exported to British possessions and the mother country.

2634 **The World's Production of Hops in 1911** (Report of the French Consul at Prague), — *Feuilles d'Informations du Ministère de l'Agriculture*, No. 37, pp. 3-4. Paris, 19 Septembre 1911.

Austria Hungary Germany France Belgium Holland Russia England United States

The total production of hops in Austria Hungary is calculated for the current year at about 18 000 tons as against 28 800 in 1910.

In Germany the crop prospects are still less favourable. Last year about 40 000 tons had been harvested; this year only about 19 000 tons are expected. In France the crop will be about 4 500 tons; in Belgium and Holland 5 500; in Russia 6000 and in England 30 000 tons.

England, where the yearly consumption of hops amounts to about 60 000 tons, will have to import a considerable quantity

(1) See Abstr. 482 *Bulletin*, March 1911.

The production of the United States is valued at 40 000 tons, the same as in 1910 (1).

Experiments in Manuring Hops with Potassium Salts. German Imperial Grants. (Unterstützungen aus Reichsmitteln für Kalidüngungsversuche in Hopfenanlagen) — *Brauer und Hopfen-Zeitung*, No. 204. Nürnberg, 30 August, 1911. 2635

This article directs the attention of hop growers to the provisions of the regulations for the enforcememt, in Germany, of the law of the 25th May 1910 on the sale of potassium salts. Under that law the State grants a subsidy of 1,000,000 marks for the development of the trade in potassium salts within the country, 200,000 marks for the German colonies, and 2,000,000 marks for abroad. According to the provisions contained in the regulations, hop growers desirous of carrying out cultivation experiments with the aid of potassium salts may apply to the Minister of the Interior in Berlin for the grant provided under these regulations, which grants will enable the growers to make manuring experiments with potassium salts entirely at the cost of the German Empire. Germany

Aug. Chevalier and Em. Perrot. **The Kola Tree and Kola Nut** (2) (Les végétaux utiles de l'Afrique Tropicale Française, publication faite sous le Patronage de MM. Edmond Perrier, E. Roume, W. Puty, Merlin, dirigée par M. Aug. Chevalier), Fasc. VI, Pp. XXIV - 483, 3 cartes, XVI pl. Paris, Mai 1911. 2636

This part of the important work which M. Chevalier has been appointed to edit takes the form of a bulky volume of nearly 500 pages. French West Africa

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(1) The importation of hops into the United Kingdom was:

in 1906	cwt. 232 619	worth	£852 476
» 1907	» 202 324	»	» 764 881
» 1908	» 279 926	»	» 767 045
» 1909	» 140 771	»	» 476 326
» 1910	» 176 781	»	» 788 056

The other countries that imported hops in 1910, were the following, arranged in the order of the quantities imported: United States, Germany, Belgium, Canada, and Austria-Hungary.

Annual Statement of the Trade of the United Kingdom, etc. for 1911, London 1911, p. 126. (*Ed.*).

(2) Cf. Abs. 465 *Bulletin* February 1911. (*Ed.*).

The following is an extract from the preface.

" It was chiefly during our voyages in the years 1905, 1906 and 1907, and afterwards in 1908 and 1910, that we were able to study more thoroughly the species producing the Kola nut, their geographical distribution, cultivation, and the trade of which these nuts are the source.

" During a stay of more than 10 months in French Guinea, we were enabled to examine in detail from every point of view the species cultivated in that colony by the natives, and to observe and record its geographical distribution.

" A stay of one nomth in 1905, 9 months in 1906-1907, and again 9 months in 1909 allowed us to carry out a similar study on the Ivory Coast, a colony particularly rich in cultivated and spontaneous Kola trees.

" In 1905 we visited a number of foreign colonies producing Kola.

" A stay of about a month on the Gold Coast enabled us to examine the interesting cultivation experiments undertaken in the Aubri and Tarkwa gardens.

" Continuing our explorations southwards, we were next led to examine the Kola trees flourishing at Lagos, in South Nigeria (Old Calabar), and finally in the Island of San-Thomé. In 1909 we furthermore examined these trees in the part of Sierra-Leone bordering the sources of the Niger.

" The botanical specimens of the genus *Cola*, collected during our different expeditions now fill more than six large botanist's specimen cases. In addition we made a large number of notes on the spot, and described the species from actual observation.

" Above all, however, in the French colonies of West Africa we were enabled during our voyage in 1908-1909, to make important observations regarding the distribution of the Kola trees and their culture. The region of the sources of the Niger, the Kissi, the Kouranko, the Land of the Tômas and the Guerzés, the upper basins of the Nuon, the Cavally and the Sassandra, inhabited by the Dans or Dyolas and by the Touras, finally the Ngans country, are pre-eminently the Kola nut producing countries, and their botanical investigation was in the highest degree interesting.

" In Lower Dahomey we visited the native plantations of *Cola acuminata* ; and furthermore observed the rare *Cola verticillata*, not identified until recent years.

" Finally, our voyage concluded with a journey through Upper Dahomey and Mossi, where Kola nuts are the staple of a very extensive traffic.

" In order to prepare a complete monograph of the Kola trees and Kola nut, it appeared to us that it was not sufficient to co-ordinate the results of our study in Africa.

" It was indispensable in the first place to go through and utilise an extensive bibliography on this question. The work of Professor E. Heckel, which formed a complete and up-to-date statement of the question in 1893, has been folowed by the publication of a large number of memoranda and articles on the Kolas. In French periodicals the reports of Cazalbon, Saussine, Teissonnier, Savariau, J. & H. Vuillet, H. Fillot, etc. appeared.

" In Germany, observations on the Kola trees, or the Kolas, were published by K. Schumann, O. Warburg, Bernegau, and W. Busse. In England, Dr. O. Stapf, Keeper of the Herbarium of the Royal Botanical Gardens at Kew, also made interesting contributions to the study of the *Cola*.

" Finally, important researches in the Chemistry, Pharmacology and Physiology of the Kolas have been carried out in recent years, especially in France, by M. Goris, under the direction of Professor Perrot.

" We hope that this work will furnish precise data to medical men, naturalists, settlers and colonial officials who endeavour to turn to account the resources of our colonies in an ever-increasing degree.

« May it contribute to render these colonies more prosperous and to make more widely known a product from which Europe does not derive sufficient benefit.

« We also hope that it may encourage persons engaged in colonial agriculture to clear up certain problems in relation to the cultivation of Kola and finally that it may serve as a guide for administrative officers, and suggest to them the extension of native plantations where the latter are likely to prove a success ".

P. Guerin. **The Kola Nut.** — *Revue Scientifique*. N. 9, P. 257 262, Paris, 26 Août. 1911. **2637**

The information on which this article is based was taken from the exceedingly interesting work full of important data just published by MM. Aug. Chevalier and Em. Perrot : *Les Kolatiers et les noix de Kola*, A. Challamel, Paris, Mai 1911. **French West Africa**

The writers have grouped the Kolas into various sections of which we shall here only retain the two created by M. A. Chevalier : *Macrocola* and *Eucola*. The former section contains the largest trees

of the genus (82 to 130 feet) ; in the latter, the only section of the genus *Cola* producing utilisable kernels, the trees are of small growth (mostly 20 to 50 feet high, rarely exceeding 65 feet).

Five principal species may easily be distinguished in the section *Eucola* ; *Cola nitida* (Vent.) A. Chev., *C. acuminata* (Pal. Beauv.) Schott. and Endl., *C. Ballayi* Cornu, *C. verticillata* (Thonn. in Schum.) Stapf, *C. sphaericarpa* A. Chev.

The *Cola nitida* is the species most generally cultivated (French Guinea, Ivory Coast, Sierra Leone, Liberia, Gold Coast) and the one supplying nearly all commercial nuts. Its seeds always have two cotyledons. It presentes a number of variations which Mr. A. Chevalier groups into four sub-sections : *C. rubra,* which exclnsively supplies big red nuts ; *C. alba,* which supples only big white nuts ; *C. mixta,* the most widespread form in the cultivated state, which yields red nuts, white nuts and sometimes pink nuts mixed on the same tree : *C. pallida,* which lives in the forest on the Ivory Coast and which supplies small sized nuts, often pink in hue

The Kola trees, which produce good nuts, are trees of the habit of our apple trees, with isolated, simple, lanceolate, acuminate leaves, which are glabrous and leathery, in the adult state, more or less glossy above, averaging 4 to 6 inches in length by 1.2 to 2 inches wide. The petiole, more or less long, almost cylindrical, has motile inflations at both ends, which by swelling, regulate the inclination of the leaf according to the light it receives.

The flowers, grouped in compound clusters, have no corolla. Their calyx is creamy white, but inside, at the bottom of the tube, it exhibits a blackish purple spot, extending half way up the lobes. Some trees produce male flowers exclusively ; the majority of the individuals produce a large number of inflorescences wholly male and then some clusters with hermaphrodite flowers at the base and male flowers at the top. Some plants have male and hermaphrodite flowers intermingled on all their inflorescences, and at times a cluster of male flowers is surmounted by one or more hermaphrodite flowers. It is very rare to find Kola trees bearing more hermaphrodite flowers than male. Messrs. Chevalier and Perrot state they never found a Kola tree carrying exclusively hermaphrodite flowers. They also draw attention to the fact that when the *Cola nitida* grows under unfavourable circumstances, either under the thick canopy of the forest, or at altitudes exceeding 800 metres (2 600 ft) above sea level, it produces only male flowers.

The number of seeds (nuts) per fruit (pod) is very variable ; from 1 to 12 are found ; 5, 7 or 9 are the most frequent. A single flower can produce from 1 to 7 follicles, or 30 to 200 grammes (1 to

7 oz.) of fresh nuts. Rarely however are more than 20 to 30 groups of follicles, which have simultaneously attained complete development, observed on one and the same tree.

The seed is provided with a white integument which the natives remove after the harvest. What we call the *Kola nut* is the seed without this integument, and consisting only of the embryo, because the albumen is wanting. The number of cotyledons, thick and fleshy, possessed by this embryo, ranges from 2 to 7. We have seen that in *C. nitida* and all its varieties, *i. e.* in the cultivated strains, it is constantly two.

In almost all works on the Kola tree this tree is said to yield several harvests per year. This is quite wrong; in reality there is only one season per year for each region, during which the greater portion of the fruit ripens.

The Kola trees grow very slowly, whatever the botanical species and the region of cultivation. In the Ivory Coast forest, a Kola tree requires 25 to 30 years to reach full development. In French Guinea it rarely produces any flowers before being 8 to 10 years old, and only about the fifteenth year do the trees give any appreciable yield. The production of the same tree varies greatly from year to year. A yield of 10 kilogrammes (22 lb.) of fresh nuts appears to be the maximum obtainable in one year from the *Cola nitida* cultivated under the best conditions.

In favourable soils the Kola tree can live to a very advanced age. According to the natives of Lower Dahomey, *Cola acuminata* lives nearly as long as four human generations, which would represent approximately 120 years.

Kola trees have many enemies. In Dahomey deep galleries are hollowed out in the branches and trunks of *Cola nitida* by a coleopteron, *Phosphorus Jansoni*. Of all the insects attacking Kola kernels, the best known and most dangerous is a member of the curculionidae, *Balaninus Kolae*. In French Guinea, Kola trees are sometimes infected with a disease manifested by the formation of witches'-brooms, and probably due to a fungus not yet studied.

Once they have been taken out from the pod, the Kola nuts must, in order to be transported over great distances, without serious damage, be very carefully packed. The caravan drivers generally line the inside of the baskets with the leaves of certain marantaceae, above all those of *Clinogyne Schweinfurthiana* K. Schum. and *C. remosissima* K. Schum. When the nuts are not required to be kept for long, they are enclosed in the wide leaves of a species of Rubiaceae, *Mitragyne stipulacea* Hiern. For conveyance to Europe packing in peat is recommended.

The world's output of fresh Kola nuts now amounts to about 20 000 tons. French West Africa alone produces 4 500 tons.

As yet Europe receives almost exclusively dry Kolas. They are divided into half-Kolas, or Kolas with two cotyledons produced by *Cola nitida*, and into quarter Kolas or Kolas with four or five cotyledons produced by the other species.

The price varies from 0 fr. 75 to fr. 1.15 per kilogramme (3 ¼ *d* to 5 *d* per lb) for nuts with two cotyledons, and from 0 fr. 40 to 0. fr. 75 (1 ¾ *d* to 3 ¾ *d* per lb) for those with four.

The imports of dry Kolas into Europe and the United States as yet only amount to 1 000 tons per annum. Very small quantities of fresh nuts have for some years past arrived in France, England and Germany. This trade will undergo great expansion when the properties of Kola are better known in Europe.

It is chiefly in Africa, however, that the consumption of Kola nuts is capable of very great increase. A black who is accustomed to use this commodity easily consumes 600 to 700 nuts per annum, *i. e.* about 10 kilogrammes (22 lbs). More than one half of the inhabitants of French West Africa *i. e.* about. 5 million individuals, are already very fond of it. The consumption is limited by the rarity and dearness of the product due to the difficulties of transport. Therefore the construction of an extensive railway system will bring about a large increase in the consumption of Kola nuts, which will thus be brought within the reach of every purse ; this growth cannot be otherwise than profitable to the business. The drying of the nuts, owing to the dehydration and to diastasic actions, entails a considerable change in the chemical composition, the most important point of which is the liberation of the greater portion of cafein, and it will be readily understood therefore that the action of Kola on the organism has been attributed to this latter. We may add, in order to be as complete as possible, as things at present stand, that the presence of betain in the proportion of 0.25 to 0.45 per cent has been pointed out in the Kola nut.

The first investigations into the physiological action of the Kola nut were carried out at the suggestion of Dr. E. Heckel. While some authors would see nothing but the effets of cafein in the action of Kola, Mr. Heckel attributed a special activity to the kola red, which was superadded to that of the cafein. Recent enquiries into chemical composition evidently prove him right, because this substance undoubtedly still contains a small quantity of cafein combined with tannin, and this tannic compound cannot remain without effect on the organism.

2638

Production and Use of Coca Leaves *(Erythroxylon Coca)* and Cocain.
La Quinzaine Coloniale, XV année. N. 16, P. 520. Paris, 25 25 Août 1911 and *Revue Scientifique*, 49e Année, 2e Sem., N. 10, P. 311. Paris, 11 Septembre 1911.

The Coca leaves are produced by *Erythroxylon Coca* Lam., a shrub of the family of the Linaceae, which grows in the regions of the West coast of South America, especially in Peru and Bolivia. Of late years, Coca plantations have been made in Java and Celyon, and considerable supplies now reach Europe from those countries, above all Java, which is endeavouring to secure the monopoly of the sale of this plant. India, the United States and the Federated Malay States, where the cultivation of Coca has also been undertaken, produce only very small quantities (1).

Bolivia. Peru. Java. Ceylon

Coca leaves enter into the preparation of several galenic medicinal substances (wine, dye, powder, etc.), but are mainly used for the extraction of cocain. According to the origin, variety, age of leaf, etc., the proportion of alkaloid contained varies between 0.30 and 0.75 per cent. Nevertheless, though some leaves, like those of the variety cultivated in Ceylon, contain almost exclusively cocain, others, like those of Java, chiefly contain homologues of cocain, which are afterwards converted into the latter.

The exports of Peruvian Coca leaves amounted approximately as follows :

in 1905	1 315 825 kil.
in 1906	2 842 916 »

In Peru, the cocain produced is impure, and is chiefly forwarded to Germany, where it is purified.

The export statistics (*Bull. of the Imp. Institute*, 1910, VIII, 388-392) for this cocain are as follows :

In 1903	7 800 kil.
» 1904	7 527 »
» 1905	6 778 »
» 1906	5 914 »
» 1907	6 057 »

(1) Truxillo, Cuzco. Huanta, Java, and Ceylon Coca leaves are knovn. The "wide leaf" variety is that of Peru and Bolivia; the "slender leaf" that of Java. The content of alkaloid is between 0.78 and 2.50 per cent. WEHMER, *Pflanzenstoffe*, Jena, 1911, p. 380. (*Ed.*).

According to the Consul General for Bolivia in London, the annual production of Coca leaves in Bolivia is about 95 000 cwt. (48,269 quintals) ; of this quantity, however, very little is exported.

From Java, up to now, only leaves have been exported, particularly to Holland and Germany, for extraction of the alkaloids. There is nevertheless a scheme on foot for the erection of a factory for the treatment of the leaves on the spot.

The exports of Coca leaves from Java and Ceylon were as follows :

	JAVA		CEYLON	
	Lbs.	Kg.	Lbs.	Kg.
In 1904	57 032	25 836	—	—
» 1905	151 057	68 429	—	—
1906	274 259	124 239	41 724	18 901
» 1907	553 765	241 806	46 986	21 285
» 1908	1 026 022	464 788	80 088	36 280
» 1909	—	—	68 306	30 943

These latter figures, supplied by the British Consul in Batavia, are perhaps rather high. According to the General Consul for the Netherlands in London, the exports for Java and Madura, in 1908, were only 416 612 kilogrammes, of a value of 166 645 florins (a florin equals about 2*s*).

Alongside these figures, which give an idea of the world's production of Coca, it may be of interest to add that de Jong (*Tesysmannia* 1910, p. 201) estimates the present annual consumption of Cocain at 12 000 kilogrammes.

2639 E. DE KRUIJFF: **Cultivation of Coca in Java** ***(Erytroxylon Coca)*** *Journ d'Agric. Tropicale* XI An. N. 121, Pp. 208-209 Paris, 31 Juillet 1911.

The cultivation of Coca (*Erythroxylon Coca*) has been notably extended in Java during recent months.

Java The exports from the Island amounted to 343 470 kilogrammes for the 1910 period (1).

The seeds are sown in a nursery sheltered by a hurdle 15 cm. (6 inches) away. After 2 or 3 weeks they begin to sprout. As soon as the young plants grow, the hurdle is removed; and the

(1) See above, Abstr. 2638. (*Ed.*).

young growths are planted in their final position in rows, 3 or 4 feet (m. 0.90-1.20) apart, when they have attained a height of 15 centimetres (6 inches).

The best sites for this shrub are those between 1.000 and 3.000 feet (300 to 1.000 m.) altitude, in a moist climate.

Two different methods of picking or gathering may be distinguished :

1, The fine crop, from plants from eight to twelve months old, supplying 240 kg. of dried leaves per bouw (1 bouw equals 1 $^3/_4$ acres).

2. The coarse or big crop, chiefly from plants growing in the shade, and yielding in four operations 816 kg. of dried leaves per bouw but of inferior value.

Fuller information is supplied by the writer in the review *Korte Berichten voor Landbouw, Nyverheid en Handel*, published by him in Java.

Scarcity of Cinnamon in Ceylon. — *Journal of the Royal Society of Arts*, No. 3062, p. 901; London, July 28 1911. 2640

With the extension of rubber and cocoanut cultivation in Ceylon, owners of cinnamon plantations in suitable localities have found it to their advantage to root out cinnamon, and plant either rubber or cocoanuts.

It hardly pays the cinnamon planter to continue cultivation of the product, at existing prices, and a good many of them have substituted the more remunerative products. This is especially noticeable in the southern province, where rubber is replacing cinnamon, and in the Uegombo district, where cocoanut cultivation is being extended. As a result of all this, there is a scarcity of cinnamon in the market just now. To make good the deficiency in the European market, cassia bark, imported from China, is being used as a substitute. Cassia bark (1) is said to have a stronger and somewhat coarser flavour than cinnamon, and is coming to be much appreciated. It is not improbable that it will swamp the cinnamon trade completely, if the cultivation of the latter is not encouraged. A rough estimate places the acreage of cinnamon cultivation in the island of Ceylon at about 54 300 acres. Ceylon

(1) *Cinnamomum Cassia* B. In China this plant is regarded as producing the best Cassia bark. It seems that the best qualities of Assam bark come from this species, and not from *C. Tamala*. Sir G. WATT: *Commercial Products of India*, pag. 310; London, 1911 (*Ed.*).

2641 **The World's Vanilla Crop in 1910-11.** (1) — *Tropical Agriculturist*, Vol. XXXVII., No. 1, pp. 37-38. Colombo, July 1911.

The world's production for the season 1910-11 amounted to 570 tons. The various crops were:

	Tons.
Seychelles	22
Bourbon	45 ½
Comoro and Mayotte	52
Madagascar	55 ½
Mauritius	8
Fiji, Java and Ceylon	7
Guadeloupe and Martinique	10
Mexico	135
Tahiti	240
Total	575

The outlook for the next season's Seychelles is poor; for Bourbon, Madagascar and Comoro fair; and for Mexican good.

2642 ZIMMERMANN. **Cultivation and Preparation of Ginger.** *The Tropical Agriculturist.* Vol. XXXVI, No. 4, pp, 312-313. Colombo, April 15, 1911.

German East Africa: Amani. China. Jamaica

Zimmermann has published in the Communications from the Biologico-Agricultural Institute at Amani the results of observations and experiments, up to the present day, on the cultivation and preparation of ginger. *Zingiber officinale* is indigenous to tropical Asia and is cultivated in numerons countries of the Tropics. Whereas African ginger yields 2 to 3 per cent of essential oil, Jamaica ginger only yields 1.075 per cent. The plant requires a fertile soil which is not too firm and not swampy. A chalky sandy loam is the most favourable for its cultivation. Ginger is grown exclusively from pieces of rhizomes 1 to 2 inches long, each of which must have at least one bud. The fields should be laid with ridges one foot, and furrows about two feet, wide.

The pieces of tuber are placed on the ridges, in holes about 3 to 4 in. deep, and 10 to 12 in. apart. The harvest commences usually after 9 to 11 months. The tubers are removed from the

(1) See Abstr. 1425, *Bulletin*, May 1911.

soil, then carefully washed and the roots are cut off. The yield from a ginger field amounts to about 8.76 to 13.5 cwt per acre; exceptionally, 17.5 cwt per acre have been gathered. The dried root is valued at 20 to 30 *s.* per cwt (49 to 74 frs. per quintal) on the London market.

In preparing peeled ginger, only the thinnest possible skin may be removed. as the aromatic constituents are present in the portion close below the epidermis. After peeling, the tubers are immediately placed again in clean water in which they are left overnight, and are then again dried.

The unpeeled ginger after having been carefully cleaned is immediately dried.

The preparation of preserved ginger takes place as follows: — The washed, boiled and peeled tubers are placed in earthenware vessels, and a boiling solution of sugar (5 lb. sugar to 1 gal. water) is immediately poured over them. After 24 hours this solution is drained off, heated and poured back into the vessel. This is repeated after 2 days. The ginger can then be taken out of the solution of sugar, and dried or sent away directly in jars.

Spice ginger is the ground root. Preserved ginger root is prepared by boiling the roots in water and curing with sugar. Much of this commodity comes from Canton. Extract of Jamaica ginger is made by extracting the ground roots with strong alcohol.

Utilisation of Gentian in France. — *Bull. de l'Assoc. de Bibliogr. et Document.*, N. 6, P. 91 Paris, Juillet 1911. **2643**

It is estimated that 150,000 bales of Gentian roots, each containing 100 kg. are despatched every year from the departments of Cantal, Puy-de-Dome, Aveyron and Lozère, to the ports of Bordeaux and Marseilles where they are shipped at a freight of not more than 20 - 25 francs per ton, to North America. In the latter country they are used for the manufacture of bitters. It would be desiderable, from the point of view of the interests of the country of origin, that a small factory should be erected in it for the extraction of the active substance from these 15,000 tons **France**

2644 **Solanaceous Drugs from India.** — *Bulletin of the Imperial Institute*, Vol. IX, No. 2, pp. 110-116. London, 1911.

Datura stramonium. — Percentages of total alkaloid found in specimens of *Datura stramonium* from India - analysed at the Imperial Institute - are compared in the following table with those recorded for the plant grown in other countries:

	Indian specimens	Other Countries
Seeds	0.186	0.21 to 0.48 (European) 0.35 (Egyptian)
Fruits	0.46	—
Leaves	0.41 to 0.45	Up to 0.4 (European)
Stems	0.25 to 0.26	Main stems 0.09 (European) Upper branches 0.36 (European) Average 0.22 (European)
Roots	0.214	Main roots 0.10 (European) Rootlets 0.25 (European) Average 0.17 (European)

It is clear that the Indian *Datura stramonium* is on the whole quite equal, if not superior, to the European plant in the amount of total alkaloid which it contains.

Results of examination of *Datura flexuosa.* The percentage of total alkaloids was as follows: Twigs and leaves, 0.019; roots, 0.101 and 0.217; fruits, 0.202 and 0.262; stems and leaves, 0.093. Scopolamine (hyoscine) is the predominant alkaloid in the twigs and leaves of *D. fastuosa* and the sole alkaloid in the fruits and roots of this plant as grown in Assam. The results obtained with the Indian plants of this species confirm generally those obtained from *D. fastuosa* grown in Europe.

Datura Metel. — Specimens received from the Punjab. The results of the determination of the alkaloids present were as follows:

	Moisture Per cent.	Total Alkaloids in dry material per cent.	Alkaloids present
Leaves	9.45	0.25	Scopolamine and a small proportion of atropine
Seeds	8.07	0.23	Scopolamine and a small proportion of atropine

Specimens of *D. Metel* grown in France were examined a few years ago by Schmid, who found that scopolamine was present in all parts of the plant, unaccompanied by any notable quantity of

other mydriatic alkaloids. The dried leaves were found to yield 0.55 per cent and the seeds 0.50 per cent of scopolamine. Kircher has confirmed these figures. The Indian plant, therefore, seems to contain considerably less alkaloids than the European one.

Hyosciamus reticulatus. — The material collected in Baluchistan was examined and the following results obtained:

	Total Alkaloid Per cent.
Seeds	0.082
Whole plant	0.240

It is stated that camels, sheep and goats eat this plant, but that cows, donkeys and horses will not touch it. No explanation can be given at present of the fact.

Hyosciamus niger from Saharanpur.

The leaves were found to contain 0.062 per cent. of total alkaloid, expressed on the dried material. Two determinations carried out on the seeds gave a mean of 0.081 per cent of total alkaloid. These results agree with those recorded for the European plant, the leaves of which have been found to contain from 0.04 to 0.08 per cent of total alkaloid, and the seeds from 0.06 to 0.1 per cent.

Hyosciamus muticus, as produced in Egypt, is of great value as a source of the alkaloid hyoscyamine, since the leaves may contain 1 per cent or more of this alkaloid, uncontaminated with the other solanaceous alkaloids. Hyoscyamine itself is but little used in medicine, but it is convertible by a very simple process into the alkaloid atropine, which is used in considerable quantities in medicine, and consequently *H. muticus* is now regularly imported into the United Kingdom for this purpose.

B. R. ANDERSEN. **Analysis of the fruit of *Solanum dulcamara*.** **2645**
— *Journal de Pharmacie et de Chimie*, 103e année, 7e serie, tome IV. No. 4, pp. 172-173. Paris, 16 Août 1911.

The berries of *Solanum Dulcamara* contain 31.55 per cent of sugar, which sugar has been identified with fructose. The fatty oil obtained from the dried berries after extraction of the sugar was of a beautiful amber colour when purified with animal charcoal and ether; it was viscous and its density was 0.9603. Its saponification index was equal to 306. Its acids were chiefly made up of ricinoleic acid. **France**

The total yield of oil was 9.15 % (1). A small quantity of alkaloids (0.15 %) was isolated, probably solanine. There were also traces of Manganese.

2646 P. GUIGNES. **Adulterating Scammony Resin.** — *Annales des Falsifications*, IV^e année, No. 33, pp. 397-398. Paris, Juillet 1911.

Turkey in Asia: Syria

A sample of Scammony resin, alleged to have originated from Syria, but in reality prepared in France, was offered under the name of « pure Aleppo Scammony resin, 87 % strength » (2).

Analysis proved however that the resin in question was a crude industrial resin with an admixture of impalpable powder of Scammony root, no doubt to make it more lucrative. The content of pure resin was 84.02 %.

This fraud is new and uncommon; it is carefully thought out and planned. Under analysis, the preliminary tests at first sight show nothing abnormal, and the external appearance of the product not being bad, there is a likelihood of the analysis being carried no further.

2647 A. LEULIER. **The Pseudo-Strophantines of the *Nerium Oleander*. Note on the Bark of the Rose Laurel.** — *Journal de Pharmacie et Chimie*, 103 année, 7 Serie; T. IV. No. 4, pp. 157-161. Paris, Août 1911.

Algeria. Italy: Calabria

The rose laurel, a shrub belonging to the family of the Apocyneae, grows spontaneously in Algeria on the banks of streams and springs. It has the universal reputation of being a poisonous

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(1) The seeds of *Solanum Dulcamara* contain 7.4 % of water and 23.9 % of fat. C. WEHMER. *Pflanzenstoffe*, Jena, 1911, p. 677. (*Ed.*).

(2) Scammony is a resinous gum, obtained from the *Convolvulus Scammonia* L., of the genus Euphorbia, whose habitat is exclusively the countries on the eastern basin of the Mediterranean. Its big, long roots are exposed and incisions made in them from which a milky juice flows out and is carefully collected. When exposed to heat and moist air, this liquid undergoes fermentation and solidifies, yielding friable resinlike masses, greyish brown in colour, of conchoidal fracture. Two descriptions are known in commerce: Aleppo Scammony and Smyrna Scammony. This drug which is a strong purgative, gives rise to a considerable trade in the East. JAC. DE CORDENOY, *Des Plantes à Gommes et à Résines* p. 369. Ed. Doin, Paris, 1911. (*Ed.*).

plant. It secretes a white and very bitter latex, solidifying rapidly in the air, and assuming a greyish hue.

Taking two kilogrammes of bark, the writer isolated a somewhat yellowish powder, consisting of irregular, glossy flakes. Reactions showed that it was a glucoside, having the properties and characteristics of the pseudo-strophantines.

The average of three tests led the writer to adopt the figure of 12.60 strophantine per 100 of solid extract. The bark, which yields 14.5 grammes per cent of solid extract, contains therefore gr. 1.81 per cent of strophantine.

The rose laurel might play some part in therapeutics and perhaps be substituted for the different varieties of *Strophantus*.

W. Lenz. **The Immediate Constituents of the Derris, used for Insect Destruction.** — *Journal de Pharmacie et de Chimie*, 103e Année, 7e Serie, Tome IV. No, 4, pp. 174-75, Paris, 16 Août 1911. 2648

The *Derris* genus belong to the Leguminosae-Dalbergieae.

Among the species of this genus, the *Derris elliptica* is used in Java for destroying insects and caterpillars, and for fishing. In Borneo it is probably a constituent in certain arrow poisons. Java

After referring to previous researches into the immediate constituents of *Derris*, the author reports his own, carried out on the dry root of *Derris elliptica*. The most prominent result is the extraction from the ether extract of the plant, of a crystallised substance, to which the name of *Derrin* was given. This substance melts at 158° C. (316.4° Fahr.) after re-crystallisation in boiling ether and alcohol; it is readily soluble in acetone, benzol, and chloroform.

The quantity of the product produced was too small to allow of thorough chemical study; it possesses an indisputable toxic action, coinciding entirely with that produced by the decoction of the root itself (1).

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(1) For investigations on *Derris elliptica* Benth. and *Derris uliginosa* Benth. (*Dalbergia heterophylla* Willd.), see: C. Wehmer, *Die Pflanzenstoffe*. Jena, 1911. p. 353. *Derride* or *Tubain* is the toxic substance, contained in the proportion of 2.5 to 3 % in the root. (*Ed.*)

2649 **World's Production of Castor Seed.** — See above, Abstr. 2610.

2650 **Harvesting the Orange Flower Crop in the Region of Blida (Algeria).** — *Bulletin de l'Office du Gouvernement Général de l'Algerie,* No. 11, p. 166. Paris, 1 Juin 1911.

In the region of Blida, the orange flower crop has been abundant, and the year 1911 may rank among good average years. The mildness of the temperature permitted methodical harvesting and perfect ripening of the flovers.

The price of the « Neroli » (product of the distillation of the Bitter Orange flower) will be low. The « petit grain » (a product of the distillation of the Bitter Orange leaf) is at present sold at 30 francs per kilogramme. For Orange Flower Water there are quotations of fr. 0.35 per litre, delivered locally (1).

2651 N. WICKREMARATNE, **The Citronella Oil Industry of Ceylon** (2). — *The Tropical Agriculturist.* Vol. XXXVI, No. 4, pp. 352-354. Colombo, April 15, 1911.

At one time citronella was grown very extensively in the Galle district of Ceylon, but it is now confined to the Matara and parts Ceylon of the Hambantota districts. It is estimated that about 40 000

(1) The winter in the South of France in 1910-1911 was milder than it had been for a long time. Calculated on the basis of the prices quoted for the flowers (85 centimes per kilogramme) the price of Neroli would amount to 350 fr. per kg. at most, that is, about 50 fr. less than in 1910. The « petit grain » continues cheap (*Schimmel Bulletin,* Avril 1911. Miltitz s. 90).

(2) Citronella = *Andropogon Nardus* Linn. (Andropogoneae, Gramineae). A grass common in the plains and lower hills of the North West Provinces and Panjab. It is extensively cultivated in Ceylon and Singapore for the production of oil of citronella. Abundant about Travancore. As cultivated it often rises to the height of 6 or 8 feet. (G. WATT. *A Dictionary of the Economic Products of India.* p. 247 Calcutta, 1889).

The exportation of citronella oil from Ceylon was 1 512 084 lbs in 1909, 1 276 965 lb. in 1908. 1 230 159 lbs in 1907, 1 107 655 lbs in 1906, 1 282 471 lbs in 1905. (*Bull: Sem. Schimmel et Cie,* Miltitz, Avril 1909 p. 38, and Avril 1910 p. 37).

The plant is also called *Cymbopogon Nardus* Rendle. See: O. STAFF: *Oil Grasses of India* and *Bull. of Misc. Inform.* Kew. 1906.

See also: JOWETT: *Ann. Roy. Bot. Garden.* Paradenya, Ceylon; 1898, IV, 185.

The Citronella grass of Salatigo, Java, appears to yield only from 0.60 % to 0.66 % of essence. C. WEHMER: *Pflanzenstoffe,* p. 42, Jena, 1911. (*Ed.*).

acres are at present under citronella, and there are, according to Ferguson's Directory, about 496 stills at work.

The commonly cultivated variety is the « Lena-batu » or « Heen pengiri ». This variety is preferred because it is hardy, and does not require frequent replanting and careful attention, and gives a good yield, though the oil is not of the best quality,

The grass is grown by planting shoots at regular distances, one to two feet apart. Eight months after planting, the grass can be cut and every third month subsequently. Women are employed for this work which they do with an ordinary sickle. After cutting, the grass is exposed to the snn for a day to wither. It is then carried to the distillery, bnt care should be taken not to keep the grass in heaps, as this tends to cause fermentation which reduces the yield of oil.

In the early days of the industry, distilling was generally done by means of earthen stills, but these old-fashioned stills are now very rarely met with.

Stills are of different sizes, and hold from 700 to 2000 lbs. of grass. As a rule two stills are worked side by side in the same factory. This goes a great way to expedite work. While distillation is going on in one, the other is packed with grass. As it takes about 6 hours to complete a distillation, two distillations can be made in a day. The spent grass is generally used as fuel for the boiler.

The steam enters the still at the bottom and passes through the grass, forcing out the essential oil in the form of vapour. This vapour escapes through the top and passes into a coil of piping which is suspended in a tank of cold water. This piping is made of either copper or lead; iron pipes are not used as they discolour the oil. As the water through which the condensing pipe passes is apt to get heated and thus prevent condensation, it is necessary that there should be a constant inflow of cold water to keep the temperature low. The longer the condensing pipe the better; its length varies from 30 to 90 feet.

The condensed steam in the form of water and oil ultimately enters a cylinder, after passing through a filter. The oil floats on the top of the water, which is drawn out from below, The oil is then skimmed away with a cup and filled into bottles or drums, but before it is ready it is generally subjected to many filterings.

An acre of citronella will yield about 4 500 lbs. of grass per crop (quarterly), or about 18 000 lbs. per annum. Good grass will yield about 17 lbs. of oil per crop, or about 68 lbs. per year.

2652 T. Proost. **Market Gardening in Provence and the Fertilization of the Stony Soil of the *Garrigues*.** (La culture maraîchère en Provence et la fertilisation des rochers des garrigues). — *Revue des questions scientifiques.* Troisième partie, Tome XX, pp. 39-49, Louvain, 20 Juillet, 1911.

When the phylloxera devastated the vineyards of the plains of Vaucluse and la Crau, which (owing to their wind-swept situation, their stony soil, and the periodic inundations of the Durance) had been made at great cost, the agriculturists suggested the formation of gardens and orchards. Trees have been planted as artificial wind-breaks in order to protect the plant from the « Mistral », and now these districts, which were once so unproductive, begin to rival the most fertile lands of Provence and to supply the Parisian markets with early vegetables and fruits of all kinds.

Garrigues (1) of next to no value, at the gates of Carpentras, for instance, are now worth from 8,000 to 12,000 frs. per hectare (about £129.5 to £194.6 per acre).

The Paris-Lyon-Méditerranée Railway Co., soon had to build special refrigerating cars to meet the requirements of the market-gardening trade between Vaucluse and Paris.

The chief crops are strawberries, asparagus, early potatoes, artichokes, garlic, tomatoes, egg-plants, cauliflowers, lettuce, spinach, parsley, cherries, apricots, peaches, figs, almonds and table grapes.

The strawberries and asparagus are exported to Paris, London, Geneva, Berlin, St. Petersburg, etc.

Remarkable results have been obtained in raising strawberries, by analysing the soil and using sulphate of iron, phosphoric acid, and potash. It has been noted, for instance, that at Carpentras and Monteux where the soil is clayey, silicious and ferruginous, the strawberries are acid but firm, and stand long journeys, whereas those grown at Orange and Avignon, where clay predominates, are larger, more fragrant, but spoil quicker. The same is true of the strawberries grown on the Riviera between Cannes and San Remo. At Nice, for instance, the finest strawberries grown on red soil, cannot be sent to Paris in spite of the utmost care in packing.

Asparagus, which is a very paying crop, is cultivated more especially near Lauris, Merindol, Aubignan, Caudenet, Cavaillon, Avignon, Chateaurenard, etc. It only does well in late alluvial soil, of a fine, porous, deep quality, which does not form a crust on the surface as

(1) Term applied in Provence and Languedoc to uncultivated land.

is the case with clayey and marly soil. The alluvial soil of the Durance fulfils all these requisites as the proportion of fine soil is at least 80 %.

Asparagus and strawberries are often grown along with vines, in the middle space, between the rows.

Early potatoes of the « Early Rose » and « Dutch » varieties, are planted out in the middle of February and are gathered in May. This crop has to compete with many rivals, as the early potatoes of Algiers, Hyères, Spain and the coasts of Normandy and Britanny, where the soil and climate are particularly well suited to this crop, reach the Paris markets very early and in always increasing quantities.

Cauliflowers are sent from Barbentane and Chateaurenard at the rate of from 10 to 12 car loads per day during the season, and whole cars of parsley are sent in the winter to Germany, sometimes fetching the very high price of 600 frs per 100 kgs (£.24 per 220.4 lbs).

The development of irrigation in the Department of the Bouches-du-Rhône is beginning to multiply there also the number of market-gardens and orchards which have so enriched Vaucluse.

2653

W. R. Beattie. **Frames as a Factor in Truck Growing.** — *U. S. Department of Agriculture - Farmers' Bulletin* 460, pp. 29. Washington, 30 August, 1911.

In certain localities where the climate is mild, such crops as lettuce, radishes, and beets can be grown during the winter months, if provision is made for protecting the plants during the rare periods of frost. The cheapest form of covering is cotton cloth or unbleached muslin.

United States

In other localities, where the climate is too severe for growing crops under cloth protection, cheap sashes filled with glass are effective.. A good living can be made on 3 acres devoted to sash gardening.

Cheap hotbeds, constructed in long lines with plank sides, may be profitably employed for forcing vegetables for the market in the neighbourhood of large cities, where an abundance of manure for heating material may be obtained.

The labour and expense involved in the growing of vegetables in frames are greater than for a corresponding area in the open;

therefore greater care should be taken in gathering, packing, and marketing them, in order that fancy prices may be obtained. (1)

2654 **High Price for Growing Peas.** — *The Gardeners' Chronicle*, Vol. L, No, 1,283, p. 71. London, 29 July, 1911.

Great Britain: England

At a sale conducted recently by Mr. G. H. Banks, auctioneer, of Kidderminster, a six-acre field of culinary « Senator » Peas fetched £44 per acre; and a 19 acre field of the same variety £25 per acre. Both crops were grown in the Stourport district. Senator was raised and introduced into commerce by Messrs Webb & Sons, of Wordsley. It was awarded a First-class Certificate by the Royal Horticultural Society on July 11, 1902, after trial in the R.H.S. gardens at Chiswick.

2655 **Strawberries on Light Soils.** — *The Gardeners' Chronicle*, Vol. L, No. 1,282, p. 52. London, 22 July, 1911.

Great Britain: England

A note with the above title, published in the *Journal of the Royal Horticultural Society* (May 1911), records the results of planting over 40 varieties of stawberries six or seven years ago. It was found that after three years many of the best varieties had failed. In spite of special care in cultivation — layering in pots in good soil and potting out the rooted plants in well manured and prepared beds — only some half-dozen varieties continue at Wisley to fruit for two years and to make really good rows in the sandy soil there. Mulching in spring and digging in the mulch at once is found to be a good practice. The varieties which have proved themselves best at Wisley are: Aprikose, Climax, Cropper, Fillbasket, Royal Sovereign and Scarlet Queen. The two last named serve for dessert fruit and force well, and for cooking and preserving purposes Climax, Cropper, and Fillbasket suffice.

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(1) See *The Science and Practice of Farming in Great Britain*, in 1910. Intern. Inst. of Agriculture. Rome, 1910, p. 279-281. (*Ed.*).

CECIL H. HOOPER, **Cost of Making a Strawberry Plantation, and Annual Cost of Cultivation** (Fruit Farming for Profit). — *Fruit, Flower and Vegetable Trades' Journal.* vol. XX; No. 47. pp. 152-153, London, August 12, 1911. 2656

Cost of one year's old Strawberry Plantation.

Great Britain: England: Kent: Scotland.

	Per acre £	s.	d.
Forking out couch, dock, dandelions etc.	0	14	0
Ploughing* (winter)	0	14	0
Three or 4 harrowings and rollings (to level the ground).	0	7	0
Marking out and planting (March).	1	0	0
Plants, say, 12 000 (at 32 × 16 in.)	2	15	0
Hand and horse-hoeing (May to October)	2	0	0
Cutting off runners (May to October)	0	10	0
Filling up where plants have died in May and in September.	0	3	0
Digging (November or December)	1	4	0
Rent, rates, taxes	2	3	0
£	11	10	0
* If manured, which is almost essential, say with 30 tons dung. previous to ploughing, add from £8 to £10 say	9	0	0
£	20	10	0
If with 40 tons per acre, total	24	0	0

The profits the first year are nil; the crop of fruit of say 5 pecks, returns but little more than the cost of its own picking, transport to market and sale

Annual Cost of Cultivating Strawberries.

	Per acre £	s.	d.
Digging (October) £1 2s., or if earthed up by mould board plough	0	8	0
Horse hoeing at 3s., hand hoeing 3 or 4 times each 5s. (March to June)	1	10	0
Forking out couch-grass (April)	0	2	0
Hand-hoeing when in bloom (June)	0	4	0
1 ½ loads of barley straw at 31s. per load	2	6	6
Carting out and littering straw round plants, spread by men, placed under the leaves by women	0	10	0
Picking and packing 1 ½ tons fruit at 4 d. per peck of 12 lbs	4	13	4
Carriage 1 ½ tons at, say, 16s. per ton, by road or rail	1	4	0
Market toll and salesmen's charges, 280 pecks at 3 d. per peck	3	10	0
Cutting off runners after picking (August)	0	7	0
Raking up and clearing off litter and runners, cost about 8s. the value of the straw being about the same	0	0	0
Horse-hoeing once	0	4	0
Hand-hoeing once.	0	6	0
Rent, rates and taxes	2	3	0
Add one-third of first year's cost, say £20 10s.	6	16	8
£	24	4	6
Returns, say 1 ½ tons strawberries at £20 per ton	30	0	0
Difference for superintendence, unforeseen expenses, interest on capital. and profit	5	16	6

In the Blairgowrie district of Scotland, however, the yield is said to reach 2 ½ tons per acre. The price per ton varies from about £15 to £25.

2657 J. Ph. Wagner. **The Yield of Roadside Fruit Plantations.** — *Le Cidre et le Poiré*, 23e Année, No. 4, pp. 104-106. Paris, Août 1911.

The plantation under examination was that of the district of Offenbach-on-the-Main, in the division of Frankfort-on-the-Main. In the autumn of 1888 the first trees were planted along the high roads of the district; this was continued subsequently, and at the present time the district of Offenbach has a total of 12 300 trees on its roads, 10 700 being fruit trees. Cider apple trees contribute the largest quantity, there being 7620 apple trees, 1360 pear trees, 530 plum trees and 920 cherry trees.

Germany

The 10 700 trees in question to-day represent a capital of 250 000 Marks (£12 500). The fruit plantations extend for upwards of 73 kilometres, or 46 miles; on one side only of the road for one third of this distance, and on both sides for the remainder.

The service trees, owing to the length of their branches are well adapted for roadside plantations, only beginning to yield at an advanced age. Generally speaking, it is impossible to rely on any return from roadside plantations for the first 10 years. It may be assumed generally that fruit trees begin to bear from the age of 8 to 10 years; between 10 and 15 the yields increase; from 15 to 20 the receipts suffice to balance or exceed the expenses; from 20 to 40, and even 50, years of age the crop and yield increase with the growth of the tree and the net profit is pretty considerable.

At Offenbach the yearly expenses of upkeep of the 12 000 trees amount in all to 8 880 marks (£444), including harvesting; making, per tree per year, an expenditure of 0.925 fr. (about 9*d.*). At the present time 2 500 trees are from 14 to 20 years old and are reckoned as productive. From 1903 to 1909, the yield per tree per year was 1.16 marks (about 13*d.*): which constitutes a small profit of fr. 0.525 (about 5*d.*) per tree. This profit will however increase with the growth of the trees. (1)

(1) In Germany, and in Württemberg expecially the practice of planting fruit trees along the roadside, thus adorning the latter and ensuring a yield at the same time, is of some standing; special schools provide for the education of the fruit-growing road-makers. After 1870, Germany extended its system of

GEORGE W. OLIVER. **The Seedling-Inarch and Nurse-Plant Methods of Propagation.** — *U. S. Department of Agriculture, Bureau of Plant Industry - Bulletin* No. 202, pp. 43 + IX Plates. Washington, March 11, 1011. 2658

The above methods are inexpensive and so simple that they can be used by persons without previous experience in the propagation of plants. United States

By their adoption, breeders will be enabled to save time in determining the value of hard-wooded plants raised by means of hybridization, while plants thus propagated produce flowers much sooner than if left to grow on their own roots.

The most remarkable feature of these methods is the certainty of the resulting unions even where other methods of asexual propagation have invariably failed.

The inarching and nurse-plant methods are described as applied to the propagation of rose seedlings, finger lime (*Citrus australasica*), mango (*Mangifera indica*), mangosteen (*Garcinia mangostana*), litchi (*Litchi chinensis*) (1), and rambutan (*Nephelium lappaceum*).

In the case of the mango, the inarch is made as follows:

When the stem of the seedling reaches a diameter of a quarter of an inch and is fairly firm in texture, it is removed from the pot in which it was sown, and divested of that part of the soil usually near the top, in which no roots have formed. The remaining part of the ball is then given a protective covering of old cocoanut fibre, chopped sphagnum or decomposed manure, and the whole enveloped in a piece, about 10 inches square, of thick sacking cloth, and tied firmly with strong string. The plant is then ready for working, and weighs about 1 lb.

The branchlet selected must not have a greater diameter than the seedling stock, and should be well ripened and have several healthy leaves.

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roads planted with fruit trees to Alsace-Lorraine; and in 1896 the roads of these two provinces gave a revenue in fruits of about 150 000 francs per annum.

Switzerland, Belgium, and Luxemburg have long since followed the example of Germany. In Italy, the Roman railways had permitted the planting of rows of vines along a few lines, but the concession was revoked. In 1902, the Minister Baccelli proposed to plant trees along the Italian roads. (ITALO GIGLIOLI, *Malessere agrario ed alimentare in Italia*, pp. 313 and 701. Portici 1903). (*Ed.*).

(1) See page 92 *Bull.* Nov. 1910.

A cut is made in the stem, beginning 2 to 3 inches from the terminal bud; in taking a slice from the stem, the cut into the wood must not be more than ⅓ of its diameter, A cut similar in length and depth is made near the base of the seedling, and the stock and scion are bound together. Then the ball of the seedling is secured to the lower part of the branch.

During the spring and summer months, the unions will be complete in four to six weeks after the operation.

The nurse-plant method, as applied to the mangosteen, consists in planting the seedlings, when about 4 inches high as close to a healthy two-year old plant of *Garcinia tinctoria* as possible, without destroying its roots, and then placing them in a humid atmosphere with the temperature ranging from 70° F. at night to 90° F. in the day.

After three weeks, the seedlings are inarched, and after six, the tops of the stock plants are removed.

2659 F. Pisciotta. **On the Expediency of Tilling and Working the Soil in Relation to its Content of Moisture and Vine Cultivation.** (L'incoltura ed i lavori del terreno in rapporto alla sua percentuale di acque ed alla produzione delle vigne). — *Giornale di Viticultura e di Enologia*, Anno XVIII, No. 9, pp. 3-11. Avellino, 1911.

Italy: Ascoli Piceno

In connection with the periodical tilling of the soil of vineyards several experimenters, especially recently, have been led, by repeated tests, to conclusions which do not always agree on the following question: is it desirable or not to dispense entirely or partly with working the soil of vineyards?

This question is being investigated by the writer at Ascoli Piceno where the need of economising the soil water is very great and he arrives at the following conclusions:

1. Vineyard soil when superficially worked, contains, especially in summer, a larger amount of water than soil worked deeply or left unworked; the latter contains least of all.

2. The production of grapes was greatest in the hoed vineyard, smaller in the vineyard that had been only ploughed, and smallest on the vines where neither tilling nor hoeing were carried out.

3. The sugar content of the grape was least in the unworked vineyard, and nearly equal on the deeply worked vineyard and the hoed one.

4. Although the conclusions of this study have no absolute value, it is once more confirmed that periodical superficial work is

exceedingly important from the point of view of the production of vineyards and economising water in the soil.

H. Faes. **Stocks for Grafting in Swiss Vineyards.** — *Le progrès agricole et viticole*, 26 An. No. 32 pp. 155-170 Montpellier, 6 Août 1911. 2660

The Swiss Vineyards are planted on alluvia or talus, on molasses, conglomerates, Jurassic formation (Alps or Jura), triassic (gypsum and cavernous dolomites), schists and gneiss, the whole largely mixed with glacial soil or erratic soil of extremely complex composition. The calcareous content only reaches 40 % in exceptional cases, the proportion varying from place to place so suddenly that an analysis of the soil and subsoils is generally essential before planting the vineyard. Switzerland

In Switzerland these analyses are carried out free of charge at the Agricultural Stations.

The cantons alone, with the authority of the Federal Department of Agriculture, have the right to import the scions for grafting or the vine plants from abroad. Private persons, landowners, or vineyard owners purchase the scions supplied by the State and then graft them for their own use. They may however buy the necessary plants from authorised nursery men, who remain continually under State supervision.

At the present time stocks, for grafting created or selected in France serve as the basis for the restoration of Swiss vineyards. The pure American stocks (particularly Riparia, Gloire de Montpellier and Rupestris du Lot), are being replaced more and more by American crossed stocks, above all, the Riparia Rupestris 3309, 101^{14}, 3306, 11 F., which, specially the two former, form the present basis of Swiss reconstitution. Furthermore the tendency in that country is to reduce the plantation of Franco American (Aramon × Rupestris I, Mourvedre × Rupestris 1202). The viticultural stations are carrying out a number of tests with a view to substituting if possible the Berlandieri hydrids for the Franco American stocks, in selected vineyards at least. The Riparia × Berlandieri 420 A. and 157^{11} were those chiefly employed.

The reconstitution of Swiss Vinayards is being carried out not only in phylloxeric centres, destroyed in the war against the insect, but also as a preventive, by substituting grafted plants for the old native vines, which have reached the age limit. At the outset of this work of restoration the Lausanne Viticultural Station set up model experimental vineyards, in which there are found the Chasselas

(fendant) the ordinary vine of the country, grafted on the stocks most used : Riparia Gloire and Rupestris du Lot, Riparia × Rupestris II F, 101[4] 3309 and 3306, Solonis, × Riparia 1616, Riparia × Berlandieri 420 A, 157[1] and 34 E., Aramon × Rupestris Ganzin n. 1, Mourvèdre × Rupestris 1202, Chasselas × Berlandieri 41 B, and to a less extent Rupestris Martin, Riparia × Cordifolia Rupestris 106,8 the 84[3] of Couderc, the Cabernet × Berlandieri 333, etc. In a few years' time these experimental vines will furnish valuable information as to the comparative value of the different stocks for receiving grafts in the most varied soils of the vinelands of Vaud.

2661 ROBERTSON BROWN. **Grape-Growing around Peshawar (India).** — *The Agricultural Journal of India.* Vol. IV, Part. III, pp. 221-226, Pusa, July, 1911.

The grape vine is vigorous and fruitful throughout the greater part of the North-West Frontier Province.

Brit. India : Peshawar

The vineyards are chiefly clustered around villages which have grown grapes for the Peshawar market for at least half a century.

The vineyards have excellent natural drainage and around the villages the land is levelled for irrigation on contour lines, scarcely two fields being on the same level. As far as possible, the vine growers irrigate every tenth day between 15th April and 15th June. After the crop is gathered, moderate irrigation is renewed till early December, after which the vines are given three months' rest.

Seven distinct varieties are grown, and the oldest villagers say that all of these were in the vineyards of their forefathers.

The pests of the vineyards of the North-West Frontier Province have not yet been studied, but it may safely be said that most of the troubles which affect European and American grape vines are also to be found there. Phylloxera is happily unknown. Mildews are common ; there are few large bunches of grapes which have not a proportion of " shanked " " scalded " or " rusted " berries. Red spider spreads every autumn. Thrips and aphides are not serious pests.

2662 O. SPERBER. **Vine Growing in Tropical Peru.** (Sud-Amerika. Der Weinbau in den Tropen). — *Export,* No. 26, pp. 469. Berlin, 29 Juni 1911.

Peru

The wine can be cultivated even in countries where the temperature averages 62° Fahr. in winter, and 78° Fahr. in summer, provided all the other conditions required are fulfilled. One of the

countries in which, notwithstanding this tropical heat, excellent wines are made is Peru.

The varieties of vine specially known and cultivated there are *Italia, Albilla, Moscatel, Quebrante. Negra* and *Moyar.*

The methods of culture, and those of wine making are primitive.

Nevertheless; up to 56-75 hectolitres of must are obtained per hectare (500 — 675 gals per acre) (1).

The vines are trained as pergolas supported by stone pillars and bamboos.

Rain being entirely absent from the vine-growing coasts of Peru, the vineyards are irrigated, thus obviating the danger of scarcity or excess of water.

In spite of their bad manufacture, the wines are excellent and suggest Tokay. The *Italia* and *Pisco* brandies are excellent. The alcoholic strength of the wines ranges from 9 to 18 (2). The average production per year is 300 000 hectolitres (6 600 000 gals) of brandy.

The vine is cultivated jointly with the olive.

ARMAND GAUTIER. **On the Mechanism of the Variation of Races and the Molecular Transformations which accompany these Variations in the Vine.** — See above, Abstr. 2448. **2663**

J. M. GUILLON. **Table Grapes in France.** (Raisin de table en France). — *Notes mensuelles viticoles.* 2 pages. Paris, 30 Septembre 1911. **2664**

The cultivation of the table grape, like that of every other fruit, tends more and more to emerge from the local comsumption stage and enter the great national and international market.

France Algeria

The production of table grapes has recently made great progress. The imports into France of Algerian grapes rose from 3000 tons in 1901 to 6000 tons in 1908. In the South, the valley of the Garonne, and the environs of Paris, the areas planted with table grapes increase year by year. According to an enquiry by the Minister

(1) These particulars are also found in BABO u. MACH, *Weinbau u. Kellerwirtschaft,* 4 Aufl. 2 B. p. 1061. Berlin 1910.

(2) According to C. HARTWICH, *Die Menschlichen Genussmittel,* pp. 735-739, Leipzig 1911, the upper limit for American wines is 16.49 which comes within the bounds of the 17 usually adopted as the maximum. (*Ed.*).

of Public Works, the grapes of every description brought to the wholesale Paris market, amounted to 2,828,000 klg. in 1902, and 6,696,000 klg. in 1909 (1).

The writer only refers to grapes cultivated in the open air, that is to say, accessible in price to the great majority of consumers. Grapes grown in hot-houses are likewise exceedingly interesting, but they come within the category of products *de luxe*, and are only found on the table of the well-to-do classes.

By far the most extensively eaten among table grapes is the Chasselas. This vine plant, as to the origin of which writers on the subject are not always agreed, is disseminated throughout the vineyards of the world, its early and full ripening and productivity being its strong points. Though other varieties of red or white grapes sometimes take the place of Chasselas, this only occurs in unfavourable years, when there is a shortage of the latter plant.

It may be estimated that at the height of the season 40 wagons of grapes, each containing 5000 kg., i. e., 200 000 reach Paris per day.

The season begins in Paris with the Algerian grapes, which in 1911 arrived about the 14th July ; then follow those of the Pyrénées-Orientales about the 5th August ; the Herault about the 10th August ; the Tarn-et-Garonne, about the 7th September, and the Lot-et-Garonne, the best, about the 10th September. There should next be added the highly prized Chasselas of Fontainableau, a large proportion of which are kept fresh, to be sold subsequently at higher prices.

The Paris-Lyons Mediterranean and the Paris-Orleans Railway Companies are the chief ones conveying these fruits. It is necessary to add that these companies have made praiseworthy efforts to encourage investigation into the best methods of packing.

Accidents have been reported, said to have resulted from the eating of grapes treated by substances used to control certain diseases of the vine, though without absolute proof ; the cases cited are indeed very rare, and this question, now under investigation, will soon be settled.

Grapes when fresh, are not only a cheap fruit, pleasing to the eye and grateful to the palate, but doctors recommend them to be eaten in a number of diseases.

Unfortunately, owing to the inadequate means of transport, many important centres are not sufficiently supplied. It may be assumed that out of 35 millions of French people, five millions only eat grapes.

The extra-parliamentary commission for investigation of questions relating to the transport of perishable commodities went into this matter, and the Director of Commercial Control in the Ministry of

(1) 1 kg. = 2.2046 lbs

Public Works published a well substantiated report on the progress effected, or to be effected by the Railway Companies as regards the rapidity of transport and improvement of plant.

Several endeavours have been made to extend the market for table grapes, not only in France but abroad. In England, the results up to now, have been very poor. The English consumers, who are used to large sized black grapes, grown in hot-houses, prefer the black grapes of Spain and Portugal, or the white Muscadine grapes.

In Germany, fresh grapes of Franch origin are highly appreciated ; but they have to compete with the Italian grapes favoured by special rates of transport.

W. N. Alwood. **Sucrose in Grapes.** — See above, Abstr. 2442. 2665

Premiums for the Cultivation of Olive Trees in France. Loi portant fixation du Budget Général des dépenses et des recetes de l'exercice 1911). — *Journal Officiel de la République Française.* Paris, 14 Juillet 1911 (1). 2666

Article 129. The credits provided by the law of the 13th April 1910 in connection with premiums for the cultivation of the olive tree shall be divided among cultivators in proportion to the areas planted with regularly cultivated olive trees. France

The minimum number of trees per hectare of olive plantation shall be determined in each region by the departmental regulations specified in article 133 hereinafter. This number shall serve as the basis for the allotment of the premium in those regions, for olive trees planted separately or as roadside or other borders.

Article 130. Olive plantations tilled at least once a year and pruned and fertilised in five-year periods, shall be regarded as regularly cultivated.

Olive plantations not complying with the minimum conditions of cultivation, or the additional conditions laid down in article 133 hereinafter, or less than 15 years old, shall be precluded from benefiting by the premium.

Olive trees to which the owners refuse to apply the collective treatment or administrative rules against olive tree parasites, shal likewise be excluded from benefiting by the premium.

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(1) See above Abs. 2385. (*Ed.*).

Article 131. Out of the sum of 2 million francs provided by the law of the 13th April 1910, there shall be first of all set aside ;

1. The sums required for defraying the expenses of supervision and examination ;

2. A sum of 175 000 fr. for division among the olive growers of Corsica in proportion to the area occupied by the olive trees cultivated ;

3. A sum to be allotted to the agricultural associations organising experimental or demonstration fields for combating the olive tree parasites.

The exact figure of this sum shall be fixed annually by a decree countersigned by the Ministers of Finance and Agriculture.

Article 132. Every year, before the 31st January, olive growers must make a declaration to the Mayor's office of their Commune of the following details:

1. The area according to the land register of their full olive plantations aged more than fifteen years, stating the total number of trees and the condition of cultivation ;

2. The number of olive trees they possess whether planted as borders or separately, indicating the state of cultivation.

These declarations shall remain affixed for one month at the door of the Mayor's office.

Article 133. In each department, regulations shall determine the additional conditions of cultivation which may be required in regard to olive plantations of the department, and the minimum number of olive trees per hectare, in the different regions of that department. These regulations shall be settled by the Minister of Agriculture on the proposal of a departmental commission made up as follows :

The Prefect, as President.
The General Treasurer.
The Director of Direct taxes.
The Director of Indirect taxes.
The Director of Registration.
The Departmental Professor of Agriculture.
Six members of agricultural associations appointed by the Prefect.

The departmental commssion shall check the operations of the communal commissions, created by the next following article, and, after examining appeals against the decisions of the latter, shall draw up a table, for the whole of the department, of the olive planted areas entitled to the premium. This table shall be settled by the Prefect.

Article 134. A communal commission appointed by the Prefect and consisting of the members of the communal commission of Agricultural statistics, the tax collector and an officer of indirect taxes, shall check the accuracy of the declarations of the olive-growers, satisfy themselves of the age and condition of cultivation of the plantations and draw up a statement of the areas in the commune planted with Olive trees entitled to the premium.

G. E. Hubbard. **Agricultural Development and Olive Production in Crete.** — See above, Abstr. No. 2394. 2667

C. Campbell. **On the Olive Tree Cultivated in the East.** (Sull'Olivo coltivato in Oriente. Nota preliminare). — *Annali di Botanica*, vol. IX, fasc, 3. Pp. 331-332, tav. VIII-IX. Roma, 31 Luglio 1911. 2668

Having had the opportunity of examining many specimens of olive trees from Smyrna and Palestine, the author observed that the Smyrna olive, which perfectly recalls that of the Italian Ionian coast — probably brought over from the ancient Greek colonies — has leaves 50-80 mm. (1) long (rarely more) with a middle width of about 12mm. pale greenish yellow in colour, with little gloss, and more whitish and duller on the under surface. Yellowish branches, long, slender and fragile, bear axillary flower clusters and elliptical fruits. **Turkey : Palestine. Italy**

The Palestine olive tree, which comes near to the most hardy form cultivated in Italy, has smaller leaves of a darker greenish yellow, 45-60 mm. long and 12mm. wide. The branches are yellowish, generally short, carrying terminal axillary or mixed flower clusters and ovoid fruits with rather long peduncles.

In both cases the leaves at the end of the branch are less developed, as occurs in the olive trees cultivated in Italy.

If we compare the features described above with those of the numerous varieties cultivated in Italy, it will not be difficult to find great affinities between the forms which may be described as typically Eastern and the Italian varieties.

(1) 1 mm. = 0.03937 in.

2669 C. CAMPBELL. **On the *Olea Buxifolia* Ait. of Tunis** (Sull'*Olea buxifolia*). *Annali di Botanica*, Vol. IX, fasc. 3, pp. 339-343, tav. X. Roma, 31 Luglio, 1911.

In the environs of Kairouan (Tunis), Mr. Campbell in April 1910 found some plants, which he classified from their general features and still more from the shape and colour of the leaves. He placed them in the species *Olea buxifolia* Ait., now amalgamated with the Oleaster and with regard to which information is wanting in the most recent works on African and Asiatic Oleaceae.

Tunis

The leaves of *Olea Buxifolia* are more or less oval or elliptical, slightly mucronate, with short petiole.

These leaves are a lustrous green above, and lighter and duller green below, suggesting the *Buxus* leaves. The branches and the habit resemble those of *Olea europoea*.

The natural station of *Olea Buxifolia* should be on the North African Coasts and the Atlantic Islands.

Its rarity, and the fact that it is now found associated with the *Olea europea*, cultivated or wild, have enabled it to elude the investigations of botanists studying Atlantic flora. It is likely nevertheless that it occurs spontaneously even in other regions. It was probably more widespread before the introduction and spread of the cultivated olive tree, and must have given way to the latter little by little. There now remain those few rare specimens which allow of the indentification of the species.

While its study adds a species to those already recorded in the genus *Olea*, in addition, according to the author, practical results may be derived from it, because it may be found to constitute a new species to be used in arid countries, either as a stock or as a direct producer, if its fruit yields a sufficient quantity of oil.

2670 MACBEAN (Brit. Cons.) **The Citrus Production in Sicily, Italy**. — *Diplomatic and Consular Reports*, No. 4737, 59 pages. London, July, 1911.

The Sicilian yearly lemon crop, which continues to increase under extended cultivation, is very roughly estimated at about 5 000 000 000 fruits or about 625 000 metric tons.

Italy: Sicily

Of these it is, again very roughly, estimated that there were:

Exported	50 %
Converted into citrate	40 »
Consumed at home or pickled	10 »

The fruit converted into citrate of lime, concentrated lemon juice and essences is called *scarto* fruit, because it represents such as, from whatever cause, could not be exported.

Only about 25 per cent. of the lemons grown in the provinces of Palermo and Syracuse are classed as *scarto*, whereas in the provinces of Catania and Messina the proportion is as much as 75 per cent.

The citrate of lemon and essence industry does not require much plant or capital.

The citrus production and by-products industry are now in Sicily regulated by the *Camera Agrumaria*. Pending the discussion of a Bill for the definitive reconstruction of the Chamber, a law was passed on July 1910 of which the main provisions may be summarised as follows:

1) A tax in favour of the Chamber of 1 lira per quintal and for each per cent. in grammes of both free and combined citric acid, on all citrate of lime and concentrated lemon juice not consigned to the Chamber for sale.

2) A commission to the Chamber of 3 per cent. on sales effected through it.

3) Control by the Chamber of citric acid factories.

4) Determination of the sale price of citrate by the Royal Commissioner.

5) The appointment of a Government Commission to recommend means for fixing a prudential minimum price for the valuation of deposit warrants during the season 1910-11, upon which the banks might make advances, to manufacturers, of three-fourths of such valuation, or, in the case of small producers or co-operative societies, in full.

6) A State endowment of 1 000 000 francs to be paid to the Chamber in 10 annual instalments, and authority to borrow 1 000 000 francs from the *Cassa Depositi e Prestiti*.

7) Special privileges to co-operative associations among growers for export, and among manufacturers of citrus by-products.

2671 **The Production of Citrus fruits, and Almonds in Crete** (1). — *Bulletin de l'Office du Gouvernement général de l'Algerie,* No. 16, p. 250, Paris 15 Août, 1911.

Crete

The entire production of mandarins in Crete is bought up by the Black Sea Countries. The orange harvest is exported to Turkey. Shipments of citrons in 1909 were sent to the following countries:

	Francs
Germany	103.717 (2)
Austria-Hungary	98.380
Greece	96.959
England	65.443
United States	33.901
Italy	29.251
France	17.098
Other Countries	22.569

The exports in 1910 amounted to about 3 000 000 kilogrammes.

The production of almonds is not great. They are exported to Hamburg.

2672 **The Production and Trade in Citrus Fruits in the East.** — *Bulletin de l'Office du Gouvernement Générale de l'Algérie,* No. 17, pp. 264-265, Paris, 1er Septembre 1911.

Exports of oranges, lemons, etc. to Turkey from foreign countries are limited to Italy, which forwards large quantities (5 427 454 kg. in 1908-09), and Greece (2 230 380 kg.).

Turkey

On the other hand Turkish exports of citrus fruits during the same period totalled 21 348 542 kg. They found their way chiefly as follows:

England	11 170 083 kg.
Russia	9 187 488 »
Egypt	2 189 548 »
Roumania	1 831 406 »
Bulgaria	1 560 795 »

It is not possible to fix the exact figure of the imports of lemons, oranges and mandarins into Constantinople. It is very considerable, and is supplied in a large degree by the production of the country itself; the extensive orange gardens of Syria and the man-

(1) Cf. Abs. 1606, *Bulletin* June 1911.

(2) 25.20 frs. = £ 1 (*Ed.*).

darin gardens of Chio, Rhodes and Kos. The first oranges, still green, are all imported from Tripoli (Syria); afterwards come those of Alexandria and Jaffa.

The lemons of Beyrout, Tripoli and Paros are put up in barrels of 300 to 400 kilos each. The mandarins of Rhodes and Kos arrive in a sort of round basket termed " coffes ".

The favourite soil for cultivation of the orange tree is the Jaffa region, where about 3 000 hectares (7 410 acres) are planted with oranges. The yearly exports from Jaffa are estimated approximately at 6 million francs.

The local varieties of oranges are: the " Scamonti " elongated, the " Hetmaty " (round) and the " Beledy " round with fine rind. The costs of upkeep are estimated at 1 000 francs per hectare per annum, and the net returns at 2 000 francs. The following table shows the quantity of cases (250 fruits) forwarded from Jaffa during the last five seasons:

	Liverpool	Egypt	Turkey	Tota
1906-1907	319 602	129 000	77 600	890 000
1907-1908	487 700	2 5 000	88 000	840 000
1908-1909	412 400	115 000	73 400	693 000
1909-1910	483 700	155 000	113 800	901 000
1910-1911	587 192	123 000	189 271	955 000

The lemon is held in little favour in Jaffa, but citrons are carefully cultivated, and every year there are exported to Odessa and Trieste about 36 000 to 40 000 cases, each containing a dozen of these fruits.

Citrus Fruit in Florida. — See above, Abstr. 2502. 2673

Dutch Trade in Citrus Fruits. (Il Commercio Agrumario in Olanda). — *Bollet del Minist, di Agric. Ind. e Comm.*, Vol. II. Serie II, Fasc. 6, pp. 208-212. Roma, 15 Settembre, 1911. 2674

Amsterdam is a centre of distribution for the orange and lemon trade, because it effects importation into Holland, Germany and even the Rhine Provinces. Netherlands.

The importation of oranges into Holland amounted to about 400 000 cases in 1911. Italy. Spain. Palestine

During recent years Spanish imports have supplanted Italian to a great extent; the goods are sold by auction on the Dutch market and afterwards conveyed to the interior.

Italy imports blood oranges and bitter oranges. In lesser quantity Jaffa oranges are also imported.

The advantage of the Spanish oranges consists in the splendid packing and the regular steamer services.

Mandarins also come from Spain, and in small quantities from Sicily.

The imports of lemons come almost exclusively from Italy, after these, at a long distance, are those from Malaga.

2675 J. Eliot Coit. **Lemon Blossoms, and Why They Fall Off.** — *California Cultivator.* Vol. XXXVI, No. 25, p. 683. Los Angeles, June 8, 1911.

United States: California

The writer has undertaken a series of experiments which are calculated to throw more light on many factors influencing the setting of lemons.

Some blossoms may be found on lemon trees at almost any time of the year, however the blooming season of April and May is the heaviest of the year. The spring bloom is made up of 3 kinds of buds, viz.: split buds, abortive buds, and normal buds. A considerable proportion of the spring buds are what the writer calls "split buds." They are peculiar in that they do not develop properly, are full width but very short and stubby. They usually split open and expose the pistil which shows a dark spot on the stigma. The petals are not developed. All of this type of buds fall off either just before or just after splitting, and never set fruit. Their nature is not well understood, nor is their function known.

Abortive buds have the petals and stamens fully developed, but the pistil is represented by a mere rudiment.

The normal buds are long and cylindrical before opening, and when open present a perfect development of petals, stamens, and a large, plump and conspicuous pistil. It is from this type of bud only that lemons are produced. It is perhaps safe to say in regard to the spring bloom that if 10 per cent. of the total buds that form, or 20 per cent. of the total blossoms that open, or 40 per cent of the normal blossoms that open, set and mature fruit, a very satisfactory crop will result.

A species of *Cladosporium* — a saprophytic fungus — grows on the stigmas and styles of the blossoms after the petals fall. As these styles should fall off any way, the fungus is of no importance.

As a result of his experiment, the writer has found that pollination of the blossoms of lemons is not necessary for the setting

of fruit. Bees are undesirable in lemon orchards because they may cause the lemons to contain more seed by bringing about pollination and fertilization. For all practical purposes, the Eureka lemon is as lacking in pollen as the Washington Navel orange.

The Lisbon, on the other hand, bears an abundance of pollen. In this variety about 60 per cent. of the grains of pollen are shrunken and void, while perhaps 40 per cent. are round and plump. It is therefore evident that lemon bloom is not shed on account of a lack of pollination, for this is not at all necessary.

Grape Fruit *(Citrus Decumana)* from the East Africa Protectorate 2676
— *Bulletin of the Imperial Institute.* Vol. IX, No. 1, pp. 15-17 London, 1911.

A small box of grape fruit (*Citrus decumana*) grown at Nairobi East Africa Protectorate was sent to the Imperial Institute in July 1910. The condition of the fruit was found to be practically perfect and its quality to leave little to be desired. These fruits from Nairobi contained more pith than the grape fruit received from Jamaica and California; this slight defect will, however, probably not exist in fruit gathered from older trees. **British E. Africa**

During the months of July and August there are practically no arrivals of grape fruit in Europe. If any quantity of the fruit could be landed in this country from the East Africa Protectorate during those two months, prices averaging ftom 15*s* to 20*s* per case of 54 to 112 fruits could be obtained.

GRIFFON. **On a Case of Bud Variation in the Peach tree.** — See alove, Abstr. 3462. 2677

F. W. POPENOE. **The Avocado in Southern California.** — *Pomona College, Journal of Economic Botany.* Vol. I, No. 1, pp. 3-24. — Claremont, Cal., February 1911; and *The Agricultural News,* Vol. X, No. 238, pp. 180-181. Barbados, June 10, 1911. 2678

The article under review deals more particularly with the Avocado plant (*Persea gratissima*) in relation to its propagation and culture in Southern California. It points out the results obtained with seedlings planted 15 to 25 years ago, and in recent trials with budded plants, and states that the prospects for the establishment of an avocado industry in this part of North America are good. **United States: California**

The article draws attention to the fact that the avocado has always been grown in Mexico and other tropical countries from seed alone, and this has caused the existence of a large number of varieties. The types grown in California, so far, may be divided into two classes; the Mexïcan, or smooth and thin-skinned varieties, and the Guatemalan, with a very thick skin and a rough exterior. This classification merely relates, of course, to the well established plants that exist in California. The fruits of most of the Mexican varieties are of small size, with a dark purple colour, but of good quality; they are considered by some to have a richer and better flavour that the larger varieties; they are also somewhat hardier than the latter, but possess a serious commercial drawback in that they are thin-skinned, and do not stand shipment. The avocados of Guatemala are very different from all other kinds, mainly in the possession of an unusually thick and tough skin, a feature that is likely to make them particularly valuable. The finest variety in this group, grown in California is known as the Lyon; this produces fruit of good size and excellent qualities. The characteristic differences between Mexican and Guatemalan avocados extend to the plant itself, for the trees of the latter type possess a more spreading habit, particularly when young, and their leaves are more narrowly lanceolate. Seedlings of West Indian and Hawaiian varieties have been grown in California, but the plants are not sufficiently old to afford definite indications as to their value.

The article is well illustrated, and concludes with a list of varieties, a detailed description of each being added.

2679 M. De Sornay. **The Custard Apple (*Anona squamosa*) in Mauritius.** — *Journ. d'Agric. tropicale*, 11e année, No. 121, pp. 197-195. Paris, 1911.

The custard apple (*Anona squamosa*) is a fruit very much sought after for its exquisite flavour. It has an agreeable aroma and is classified among the best in Mauritius.

Island of Mauritius

These fruits may attain a diameter of 5 to 12 cm. (2 to 5 inches) according to the conditions under which they grow. The fruit is spherical, areolar and covered with round, sometimes bnlky, tubercles.

They present different appearances, and it may be observed that sometimes the contour of the areoles is pink, sometimes white, while the general tint is yellowish green.

This tint varies with the climatic conditions of the locality. The black spots which often colour these tubercles are most probably due to insect stings. The mesocarp or pulp is white and its proportion varies.

The plants are sown in beds and afterwards transplanted in well manured light soil. Flowering occurs in two or three years. The way in which the plant thrives depends on early care in cultivation; and the beauty of the fruit depends on the climatic conditions of the place. In hot and dry regions, when the plants grow vigorously in light soils, the fruits are superior. In a moist locality they will remain stunted and produce small and inferior fruits.

According to the analyses contained in the tables published by the writer, the custard apples, on reaching maturity, have 46.75 % of skin, 45.55 of pulp and 7.69 % of seed (1).

Their composition is 63.94 % of water, 33.68 % of organic substances and 2.38 of ash. With regard to the composition of the pulp, which, as stated, forms 45.55 % of the fruit. it is as follows:

Water	38.06
Ash	0.33
Fibre	0.42
Fat	0.83
Sugary substances	0.72
Non-nitrogenous substances	4.54
Proteids	0.65
	45.55

Examination of the ash suggests that its relatively high grade of potassium and phosphoric acid indicates that proper manuring when planting, and other fertilizers applied a little before blooming, will give excellent results.

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(1) H. C. PRINSEN GEERLIGS (*Chem. Zeit.* 1897, 21, 719) gives analyses of the *Anona muricata reticulata* and *squamosa* natives of Java.

The smaller *A. squamosa* contains a less proportion of sugar than the two others. The analysis is: 50 % of pulp, 38 % of skin and 12 % seed. In 100 % of pulp, there was 0.5 % of saccharose, 5.4 % of glucose and 3.6 % of fructose; total of sugary substances 9.50 %. The *Anona reticulata* contained 10.42 % of sugary substances, and the *A. muricata* 11.62 %.

Cf. *Jahresbericht über Agriculture-Chemie*, Neue Folge XX, 1897, pp. 309-310. Berlin, 1898. The Anona is cultivated successfully at Reggio-Calabria in Italy, (*Ed.*).

2680 **The Fig Industry in Texas**, — *California Fruit Grower*, Vol. XLIV, No. 1209, p. 7. San Francisco, 9 Sept., 1911.

An address was delivered before the Texas Nurserymen's Association on July 27, on the possibilities of the fig industry, by, R. H. Bushway. Among other things, he said:

United States: California

The growing of commercial figs in a large way is the newest fruit industry in the South. The first planters took a gambler's chance when the work was started; in fact, the industry is so new that not one man out of a thousand in the United States knows of its existence. Judging by the past and present, the Texas fig will, as rapidly as it can be produced, become a household necesity through the United States. The section wherein they can be grown commercially is limited to a narrow strip along the coast in what is known as the "Gulf Coast Country of Texas". Further the supply of trees for planting is and will continue to be limited, and those two factors will always tend to curtail production.

Last year the Carpenter Fig Company not only supplied most of the dining car service in the United States, but sent figs by carloads to California; in fact, the demand is already so great that it will be impossible to catch up for many years.

2681 **Almond importation into Mexico.** (L'Importazione delle mandorle nel Messico). Rapport du délégué commercial italien au Mexique. — *Bollettino del Minist. di Agric. Ind. e Comm.*, Serie II, Fasc. I, pp. 18-19. Roma, 1° Luglio 1912.

In Mexico, there are no almond plantations. Therefore almond imports are considerable; they come from Spain, the United States, Great Britain and Germany. The last three countries only export Italian products into Mexico. The following figures indicate the importance of the Mexican market, to which direct Italian imports contribute in far smaller proportion than indirect.

Mexico
Italy

	Total Imports	Value of Italian Imports (1)
1906	373 074 pesos (2)	762 pesos
1907	255 488 »	12 574 »
1908	346 033 »	3 721 »
1909	265 320 »	828 »
1910	640 992 »	1 401 »

(1) According to L. PASQUALUCCI, *Annuario d'Italia per l'Esportazione e l'Importazione*, 1910, p. 1031. Italian imports of husked almonds into Mexico in 1904-05 were valued at 2 204 dollars.

(2) The Mexican peso or dollar (gold) is worth 24.58 pence (= 2.68 fr.) Cf. *The Statesman's Year Book for 1911*, p. 1013, London, 1911. (*Ed.*).

The favourite variety of almonds is the " Esperanza " which corresponds to the Italian variety " Mollese " with semi-hard shell.

TH. BIELER-CHATELAN. **Lime Stone Soils and Chestnut Trees.** *Extrait des Procés Verbaux de la Société vaudoise des Sciences naturelles.* Lausanne, Séance du 5 Juillet 1911. 2682

" Generally the Chestnut tree is believed to be calcifugous. According to MM. Fliche and Grandeau, it dislikes highly calcareous soils. According to M. Chatin from 2 to 3 % of lime would often be a fatal dose to the Chestnut tree.

" On the other hand Professor Engler has shown (*Berichte der schweiz. bot. Gesellschaft* XI, 1901) that the chestnut tree can thrive on soils of very various petrographic origin containing up to 20 % and more of limestone. M. Bieler has verified this fact in several places in Switzerland and Italy. **Switzerland. Italy. France: Savoy**

" Lime does not seem to be injurions therefore to the chestnut tree, because it passes into its leaves and wood in considerable quantities, even when the tree grows on soils very poor in lime.

" But this is not all. M. Bieler found proof that the direct depositing of lime at the foot of chestnut trees has no harmful effect ; the great lime kilns which overlook Monthey (Canton of Valais, Switzerland) are surrounded by numerous chestnut trees growing on the granitic moraine. For several years lime waste has been dumped at the foot of these trees without causing them greater inconvenience than if large masses of ordinary earth likely to impede the respiration of the roots more or less were heaped up there. All that happens is that some of them show a slight chlorotic yellowing of the leaves, which may be attributed as much to asphyxia of the roots as to direct action of the lime.

" Lime therefore seems not to harm these chestnut trees in any way. Quite the reverse, it has, if anything, a favourable influence in rendering available the potassium which abounds in this granitic soil and thus supplying it in larger quantities to the roots.

" We are thus to assume that the failure of chestnut trees on certain calcareous soils is due far less to high grades of lime than to *deficiency of potash.* Indeed analysis shows that the characteristic feature of the chestnut trees in calcareous soils is above all the scarcity of potash in all parts of those trees ; the alkali only amounting to one-half or one fourth the proportions observed in chestnut trees growing in silicious soils adequately provided with potash.

This would afford an explanation of the precarious growth of chestnut trees in many calcareous soils, like those for instance which

the writer was enabled to observe at Puyat near d'Annecy (Haute Savoie, France), on Urgonian limestone. These trees appear barely to find a subsistence. They still succeed in ripening their fruits, but they are far from reaching the full size of their congeners in soils abundantly provided with potash.

Possibly the use of potassic fertilisers might result in improving the chestnut tree on soils more or less deficient in potash. M. Bieler proposes to carry out experiments on the point.

2683 **The Production of Carob Beans in Cyprus.** (Rapp. du Cons. Franc. à Larnaca). — *Bulletin de l'Office du Gouvernment Général de l'Algérie*, No. 17, p. 264. Paris, 1er Septembre 1911.

Cyprus

The Carob tree is cultivated in Cyprus almost exclusively for export, which is very profitable.

During the last three years the exports of Carob beans from the island we e as follows:

En 1908	57 019	tons.
» 1909	44 959	»
» 1910	37 484	»

In 1910 the principal countries buying the Cyprus Carob bean were, in the order of importance:

England	28 375	Tons.
France	5 235	»
Egypt	3 139	»

Next follow Germany, Spain, Greece, Italy (1), etc,

The foregoing figures represent almost the whole of the production.

(1) Italy exported (from Sicily in particular) the following quantities of Carob beans:

	Carob beans					
	Quantity Quintals (1)			Value Francs		
	1908	1909	1910	1908	1909	1910
Austria-Hungary .	36 698	32 089	51 249	—	—	—
Malta	29 710	30 493	23 921	—	—	—
Other countries . .	11 237	10 749	8 215	—	—	—
Total . . .	77 645	73 331	83 885	1 009 385	953 303	1 090 505

Cf. *Statistica del Comm. Spec. di Imp. e di Esp. dal 1° gennaio al 31 dicembre 1910.* (*Ed.*).

(1) 1 quintal = 220.548 lbs.

Electricity in the Ripening of Bananas. — *The Times Engineering Supplement*, p. 19, London, 16 August, 1911. 2684

An interesting installation of electrical apparatus in connexion with the banana trade is to be found in the cellar of a fruit and commission house at Louisville, Ky., where electric radiators are employed to ripen the fruit for local consumption. Formerly gas was employed to heat the air in the ripening compartments, but after a disastrous explosion it was decided to use electric radiators. The ripening rooms comprise two compartments measuring 8ft. by 10ft. and 6ft. 6 in. high They are separated from the rest of the cellar by double partitions with intermediate air spaces. The bananas are placed on hooks suspended from the ceiling. A resistance type of air heater, consuming from 900 to 1 200 watts at its three temperature steps, is placed on a zinc mat on the floor, and keeps the room temperature at the desired range of from 60° F to 80° F. The ripening process, which requires 48hrs. is assisted by maintaining a temperature of from 75 F. to 80° F. for that period, and for storing the fruit after it has ripened, the temperature should be 60° F to 70° F. The three-step switch on the radiator enables this regulation to be made conveniently. During ripening the bananas give off a good deal of steam and moisture, and the chemical processes that occur in ripening also produce an appreciable quantity of heat. The heater is operated on the middle step continously, except during the very warm summer months, when the ripening process does not require artificial heat. During an average month the heater consumes 495kw. hours at a cost of $ 24,75 (nearly £ 5). United States: Kentucky

The Banana and Its Culture in Jamaica. — *The Tropical Agriculturist*, Vol. XXXVII, No. 1, pp. 20-33, Colombo, July, 1911. 2685

The acreage under bananas in Jamaica was in 1909-1910 69 066 acres, of which 28 610 were in St. Mary's and 12 758 in St. Catherine's parishes. The exports in 1909 were 16 712 210 stems for a value of £ 1 403 829 15s. 9d. The prices per 100 bunches varied from £5 10s. in December to £12 10s. in May. Jamaica

In the irrigated district of St. Catherine's a fair average amount that should be allowed for preparation of land and cultivation until the bananas begin to bear is £15 an acre, and the annual expenditure afterwards would be £10 an acre. The yield ought to be at the rate of 225 to 230 saleable bunches per acre, and putting the contract price all the year round at £8 15s. per 100, the receipts would average £20 an acre.

In the banana districts of the north side the cost to bring an estate into bearing would be about £10 per acre, and the maintenance afterwards £7 10s per acre. The yield may be put down at 175 to 180 saleable bunches per acre.

According to the accounts for one year of an estate of 200 acres in an irrigated district on the south side: the total number of bunches gathered was 57 612 of which 43 827 were vendible that is 76 % of the total. The gross returns amounted to £3 935 10s 8 ½ *d*, and the net profit to £1 597 16*s* 4*d* or about £8 per acre.

In a non-irrigated district on the north side, 31 acres were planted to produce a crop the following year. There were besides 135 acres yielding fruit, of which 50 acres were plants and 85 were ratoons, The total expenditure was £1 250. The saleable bunches amounted to 40 916, or 303 to the acre. The receipts were £458 from miscellaneous sources, coconuts, cattle, and cocoa, and £2 210 15s. 3d. from bananas.

2686 COUSINS. **Banana Cultivation in Jamaica** (1). — *Nature.* Vol. 87, No. 2177, p. 88. London. July 20, 1911.

The *Bulletin of the Department of Agriculture, Jamaica* vol. I, No. 4, contains an account, by Mr. Cousins, of the cultivation of
Jamaica the banana in Jamaica and the conditions under which success has been attained. Restricted as this plant was in the early days to virgin soils only, it was thought to be a crop that must soon cease to count in the islands. But the growers have learnt how to irrigate bananas, and also to grow them on heavier types of soils, so that now there seems no obstacle to their cultivation, wherever they might be thought useful.

2687 G. C. DUDGEON. **Fruit Growing and Banana Culture in Egypt.** — *The Department of Agriculture and an Indication of Some of the Agricultural Problems in Egypt. — The Agricultural Journal of Egypt,* Vol. I, pp. 6-7, Cairo, 1911.

Fruit-growing in many parts of the country has proved very
Egypt remunerative. Date palms still occupy the most prominent posi-

(1) Acres under cultivation and care in 1909, 894 638, of which 259 623 were under tillage, and 635 015 under pasture. Under sugar-cane 30 153 acres; coffee 25 230; bananas 69 066; tobacco 837; cocoanuts 14 510; corn 519; cacao 11 350; ground provisions, 104 729; Guinea grass, 137 663; common pasture, 396 409; common pasture and pimento, 101 143. (*The Statesman's Yearbook for 1911,* p. 266. London, MacMillan 1911). (*Ed.*).

tion in Egypt among fruit trees, but much remains to be done with regard to the introduction of better varieties. Orange trees are successful in most parts of the country, but are subject to the attacks of scale insects in the same manner as in other parts of the world.

The disease has become so prevalent in some localities, and is said to survive the spraying with the usual copper sulphate solution to such an extent, that it may be advisable to resort to the cyanide tent process which for many years has been successfully employed against the pest in Florida. This process involves the use of a highly poisonous chemical, and could only be applied by special permission, or by a qualified staff under Government control. The introduction of some new species of bananas has been attended with much success. The variety which is cultivated in the Canary Islands, and which is separated botanically under the name *Musa Cavendishii*, (1) seems particularly suitable for cultivation in certain localities in Egypt.

T. Jackson and G. N. Sahasrabuddhe **Cocoa-nut Cultivation in Antigua and in Bombay Presidency**. — *The Agricultural News*, Vol. X, No. 233, pp. 100-101. Barbados, April 1, 1911. 2688

The planting of cocoa-nuts in Antigua, Leeward Islands, is only in its experimental stage, but the general appearance of the plantations, started some 3 or 4 years ago is on the whole encouraging. At the present moment, there are 150 acres (60 hectares) under cocoa-nuts in Antigua. The majority of the plants for this area were raised at the Botanic Station, from which institution 7 500 plants have been sent out during the last few years. Unfortunately, here, as in other places, a large percentage of the nuts fail to germinate, and it is advisable to have about 40 per cent. more nuts in the nursery than the number of plants that it is desired to plant out in the field. The best germination has been obtained when the nuts are planted horizontally, or with the pointed ends turned upward.

Leeward Islands: Antigua. British India

(1) « Chinese Dwarf » or « Dwarf Jamaica » banana: panicle very large, the fruits 200-250, small, 4-5 in. by 1 ½ in. or more, yellow; skin thick, flesh delicate and fragrant. stands more cold than most bananas. K. M. Wiegand in L. H. Bailey's, *Cyclopedia of American Horticulture*. Vol. II, p. 1038, N. York and London, 1906. For the Roatan variety of banana, See above, Abstr. 2595. (*Ed.*).

With the exception of scale insects, cocoa nuts do not at the present time, in Antigua, suffer from the attacks of any serious pests, as far as can be gathered; only *Aspidiotus destructor*. attacks these palms to any great extent. For some time after planting, this pest seriously retards the general development of the trees. The larger trees, however, some of which are between 14 and 16 feet high, appear to have sufficient vigour to withstand successfully the attacks.

In the Bombay Presidency cocoa nut plantations thrive best near the sea shore. The cocoa-nut can grow as far inland as 150 to 200 miles, but the first five or six miles from the sea is the most favourable position, Sandy soils, free from stones or clay, are the best. The life of a cocoa nut tree is from 80 to 100 years, but it gives its best return when it is from 20 to 40 years of age, though it affords an average yield 10 years after being planted. Each tree yields from 125 to as much as 800 nuts (1) per year, though the mean may be taken as 150 to 200 nuts. The cocoanut tree is of immense importance in Bombay, as nothing of the plant is wasted. The stem serves the cultivators for building their huts, the leaves forming the thatch; the ribs of the leaves are made into good brooms, the core affords excellent ropes which are much valued in navigation; it also supplies an excellent material for making mats and brushes; good buttons are made from the hard inner shell; the copra yields a good edible oil, and the oil cake forms a valuable cattle food. Cocoa-nut oil is used in cooking, or as a substitute for butter; also for the toilet, for burning, and for making soaps and candles. The tree is tapped for extracting a beverage called "madi", which is either drunk, or evaporated down to concrete sugar ("gul"), and is used as such, or sold for refining.

2689 SCHUMACHER. (Brit. Cons.). **Development of Cocoa Planting in Santo Domingo.** — See Above, Abstr. 2604.

(1) Cf. this *Bulletin*, December 1910, p. 282: *Yield of Cocoa-nuts per Tree*. (*Ed.*).

WILLIAM WICHERLEY. **Cocoa-nut Cultivation and Copra Industry in Ceylon** (Cocoa-nut Lands: the Copra Industry. — *Supplement to the Tropical Agriculturist.* Vol. IX, No. 1, pp. 74-75. Colombo, July 1911. 2690

As a rule, cocoanuts are planted 70 to 75 trees to the acre. In Ceylon and Southern India they come into partial bearing at 7 to 8 years; when 10 years old they are in full bearing, and will yield uninterruptedly for 70 years or more. Ceylon

The average yield of a full-bearing plantation is not more than 45 nuts per tree per year (1), during which there are 6 pickings.

There are many estates where individual trees will yield 70 to 100 nuts for copra each year, but they are the exception. Manurial experiments have conclusively proved that under proper cultivation the Ceylon cocoa-nut may be made to yield a much higher average than that above recorded. The lower the count is to the candy (1 candy = 560 lbs.), the higher is the value of the nuts for copra. The average count in Ceylon is 1 300 nuts to the candy, in Java and the Dutch East Indies it is 1560 nuts; in the Philippines it is over 1700 nuts. The Ceylon product yields also a fibre which is always in good demand.

The fibre obtained from a candy is 7 cwt for mattresses, and 1 ½ cwt. for brushes. A candy of 1300 nuts produces 42 gallons of oil, and in « poonac », which is the residue « cake », about 45 per cent of the whole. Present value of unhusked nuts on the tree = £4 17*s.* 6*d.* per 1000. In desiccated form 1000 nuts yield 330 lb., whilst the parings, which yield high-class copra, average 35 lb. in weight. The present price at Colombo of desiccated nuts is 20 cents per lb., and of nut parings copra Rs. 80 per candy of 560 lb. The returns of a fully bearing estate of 1 000 acres may be calculated as follows: Number of trees, 70 000; annual yield, 3 000 000 nuts; gross value of nut harvest, £14 675; total outgoings, Rs. 80 per acre; total net profits, £8 675; net profit per acre, about £8 12*s.* 3d.

In the cocoa-nut industry, as it is run under native management to-day, there is an enormous waste of fibre and other by-products. Tons of husks are simply allowed to rot on the ground, whereas if the fine long fibre which they carry were utilised, it would add considerably to the profits of the industry.

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(1) Cp. *Bulletin*, p. 282, December 1910. (*Ed.*).

The finest copra comes from the Malabar Coast, the next in value being produced in Ceylon, whilst that from the Malay States, Dutch East Indies, Philippines, and the South Sea Islands follows in their stated order (2).

2691 BRYANT. **Philippine Copra in 1910.** — *The Tropical Agriculturist.* No. 5, p. 396-397. Colombo, May, 1911.

The bulk of the Philippine copra has gone to France, which took 76 581 tons in the fiscal year, or 65 %, of the crop. Other large buyers of Philippine copra were Spain, 10 484 tons; Germany
Philippines 8 812; Italy 7 338; United States 5 539; United Kingdom 1 887, and Belgium 1 320.

As to the general condition of the plantations. considerable increases in plantings have been made in the last six years, but only now is the Philipine farmer waking to the fact that too close planting is an economic error. New groves are being set out with ten metres space between the trees, and one of the largest land holders has engaged a foreign expert to plant 100 000 trees annually for the next ten years.

The planters will not co-operate to produce a first-class article and the major portion of the output is of poor quality.

Efforts to induce the planters to put in steam drying plants thus far has met with refusal on the part of the big growers, without whose aid the plan cannot succeed. Government aid and suitable legislation may be invoked to raise the quality of the product, as it is estimated that every *picul* (133 ½ lb.) shipped out

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(2) The exports of Copra, January to May 1911 were the following:

	Tons.
Ceylon	5 643
Java	31 878
Singapore	22 962
Penang	8 515
Cochin	7 343
Padang	4 096
Macassar	12 626
Moluccas	22 201
Manila and Cebu	30 400

(Supplement to the *Tropical Agriculturist*, Vol. IX, No. 1, p. 74, July 1911). (*Ed.*).

means a loss of Rs 1.50 to the producer because of the inferior quality. (1)

O. W. BARRETT. **Cocoanut Culture**. — *Farmer's Bulletin* No. 17. *The Government of the Philippine Islands Department of Public Instruction, Bureau of Agriculture.* Manila, 1911. 2692

The cocoanut crop deserves more attention from the planter than it at present receives.

The export value of the copra, as shipped from the Philippines, is now abont 20 000 000 pesos which, by proper cultural methods, could be increased to at least 25 000 000 without increasing the area now under cultivation. Philippines

The seed nuts should be selected with reference to individual qualities of the parent tree. They should be hand-picked, cured after picking and so treated in the seed bed that the germinating parts do not receive any check from over heating or lack of moisture. Transplantation should be done either before the nourishment in the seed nut is exhausted, or not until the plant has a small trunk, and, if possible, only during the rainy season. The chemical constituents of the soil are of little account provided the soil is not too clayey or too wet. The plantation rows should alternate eight to ten metres apart. Secondary crops may be planted during the first few years. No plants but leguminosae should be allowed within one metre of the young cocoanuts, and 2 metres of the older ones. Leguminosae supply nitrogen to the soil and keep it ventilated, and its surface cool and moist. The soil surface around young cocoanuts should always be covered with live leguminous mulches which check over-heating and evaporation. The interspaces should be covered by some form of leguminous vine, even in old plantations. Fallen leaves should be stripped and the midribs buried in shallow trenches; the husks should be composted in a long heap; the decayed bush material should be used about the young plants, as should also ashes from the shells. Machine cultivation is recommended only for special cases; the disk harrow instead of the plough is advised whenever the soil surface must be lightened.

The nuts should be hand picked after the crown attains a height of five metres or more; the bamboo pole and knife may

(1) See page 282 *Bulletin* for December 1910, and Abstract 2163 *Bull.* for July 1911.

be used up to that stage. The nuts should be cured on a drying platform for one to three weeks, bamboo platforms about one metre from the ground are used to " dry out " those to be used for copra.

Artificial driers using cocoanut shells for fuel are recommended for the production of copra. The unsmoked copra made by this method should always fetch a higher price in the world's markets.

Either woven wire, or a line of reinforced buñga trees is recommended for protecting the yonng plants from pigs, deer etc.

In the first years of its life the cocoanut is exposed to many dangers. Among the fungus diseases, the principal is " bud-rot ", this attacks the " heart " of the crown, the leaves die, or turn yellow, and the fruits drop. As soon as these symptoms appear, the tree should be felled and the bud, leaves, and upper portion of the stem should be burned or buried.

The cocoanut being shallow-rooted, suffers from prolonged periods of drought ; irrigation is of much benefit, especially when the trees are young.

Commercial fertilizers, while moderately beneficial, are not necessary, provided that an adequate amount of leguminous cover crops be used. If all the by-products, such as cake, ashes from the shells, and compost material from the husks are returned to the plantation there is no impoverishment of the soil.

Strict attention to the sanitation and nutrition of young trees is necessary.

2693 **Fruit Production in Canada. Commission of Conservation, Canada.** Lands, Fisheries, and Game; Minerals. — *Ottawa : The Mortimer Co. Ltd.* 1911, p. 23.

Orchards, Fruits and Vegetables, 1891 *and* 1901

Canada : British Columbia

FRUIT LANDS	1891 — Acres	1901 — Acres
Orchards	378 396	354 545
Vegetables and small fruits	77 140	116 517
Nurseries	2 975	1 561
Vineyards	5 951	5 600
Total	464 462	478 223

Fruit Trees and Fruits, 1891 and 1901.

KINDS	1901 (1)		Quantities of Fruit	
	Non-Bearing (Number)	Bearing (Number)	1891 (Bushels)	1901 (Bushels)
Apple trees	4 028 086	11 025 789	7 563 894	18 626 186
Peach trees	481 790	819 985	43 690	545 415
Pear tree	344 808	617 293	229 283	531 837
Plum trees	963 426	1 452 269	269 631	557 875
Cherry trees	385 288	903 140	197 090	336 751
Other fruit trees	37 555	141 870	324 789	70 396
Grape vines	475 243	2 308 353	12 252 331 lb.	lb. 24 302 634
Small fruits	—	—	—	qts. 21 707 791
Maple sugar	—	—	25 088 274 lb.	lb. 17 804 825

British Columbia.

The fruit industry in British Columbia has made rapid advances in the last few years. In 1901, there were 567 000 fruit trees ; in 1903, there were 1 000 000 trees ; and in 1905, the number has almost reached two and a half millions.

Fruit Judging Standards. — *Family Herald and Weekly Star*, Montreal, Canada, August 30, 1911, p. 15. **2694**

Standards for judging fruit at exhibitions have been drawn up by a committee, convened by W. T. Macoun, Dominion Horticulturist, and appointed by the Fruit Growers' Association of Ontario. For apples and pears on single plates the score card is as follows:

Canada: Ontario

Form	15
Size	15
Colour	25
Uniformity	25
Freedom from Blemish	20
	100

(1) In the census of 1891, the number of fruit trees was not ascertained.

For apples, pears or peaches in boxes :

Fruit:

Size	10
Colour	20
Uniformity	15
Freedom from Blemish	15
Texture and Flavour	15
	— 75

Package and Packing:

Material	3
Finishing	4
Fulness or Bulge	4
Solidity or Compactness	5
Attractiveness and Style of Pack	5
Alignment	4
	— 25
	100

Injury by insects, fungus, bruises, loss of stem, or other cause lessening the value or appearance of the exhibit shall be called a blemish.

Exhibits must be correctly named.

Fruit on exhibition shall have natural bloom.

In collections it is desiderable to have as long a season as possible represented by the varieties shown.

Varieties past condition shown for the purpose of lengthening the season will not, however, score as high as apples in condition though of a later season.

Large size is not as important as high colour and freedom from blemishes.

Specimens should be as nearly alike in size, form, and colour as possible.

Alignment refers to the rows of fruit in the box.

The skill and good taste of the packer is shown in the appearence of the fruit and the style of the pack.

Before the top is put on, there should be a bulge of one and one-half inches in the centre of the top row and the fruit should be one quarter of an inch above the top of the box at the ends. When the cover is on, there should be a bulge of three-quarters of an inch at the centre, at both top and bottom.

The Exportation of Australian Apples. — *The Gardeners' Chronicle*, Vol. L, No. 1,282, p. 53. London, 22 July, 1911. 2695

That the export trade in apples from Australia (including Tasmania) increases year by year is shown by the following statistics:

Port	Cases exported in 1909	1910	1911
Melbourne	120 000	168 000	149 000
Hobart	172 000	228 000	295 000
Adelaide	49 000	56 000	31 000
Sydney	—	1 000	1 700
Fremantle	—	—	4 000
Totale . . .	341 000	453 000	480 700

Australia

A single boat shipped recently no fewer than 112 000 cases, and it was estimated that in a single week as many as 246 000 cases were put on board at Hobart.

The Tasmanian Apple Season. — *Cold Storage*, London, August 17th, 1911. 2696

Production is on the increase in Tasmania, and the fruit growers of the State are looking for a wider market. Only two years ago the total quantity exported from Hobart during the months of February, March, April and May, including that sent to Brisbane, Sydney, Melbourne, Adelaide, Fremantle, and New Zealand ports was 595 169 cases; this year during the same period the total has reached 983 264 cases. As the total exported to the United Kingdom was only 61 580 cases more than last year, it will be seen that the trade with this country has not grown so fast as with the inter-state ports, New Zealand and South America. A total of 691 316 cases for the United Kingdom does not seem much to absorb, but the later arrivals, those since the middle of June, have not covered cost and expenses. If the whole quantity had been delivered in London before, say, June 20th. the Tasmanian grower would have recorded the highest average result in the history of the trade. The delay was due to inability of shipowners to provide the necessary refrigerated space within the ordinary shipping season, mid-February to end of April. Prospects for next year are better in this respect, as there will be more steamers available. According to Mr Powell, the United States Government pomologist, the best temperature for apples is about 33° Fahr., never below 33° and never above 36° or 37° at the utmost, and he is asking for those temperatures for all cargoes in future.

Tasmania

2697 PERICLE DE BARTOLOZZI. **Mulberry "Meadows".** (I prati di gelso). — *Il Villaggio*, No. 1826, p. 303. Milano, 24 giugno 1911.

Mulberry meadows are produced by transplanting direct to the field, and not to the second nursery, the small mulberry trees taken from the first nursery and by cutting all the branches down to the ground every year. This system, exclusively employed in Japan, precludes every possibility of infection with *Diaspis*.

Austria. Japan. Italy.

Soil intended for this culture is prepared by being trenched all over down to at least 40 cm. (16 inches), by autumn manuring (50 quintals of stable manure and 10 quintals of basic slag per hectare (247 acres), completed by a spring manuring (18 % superphosphate, 4 quintals; potassic salts 1.5 quintals; sulphate of ammonia 1.5 quintals) (1) also per hectare.

The little mulberry trees are planted at distances of 40 cm. × 40 cm. (16 in. × 16 in.), and must be irrigated every two or three days until they have taken root. During the first year 2 or 3 tilths are required to destroy weeds; in the following year a single weeding will suffice, after cutting the leaves.

Steps are taken to maintain an abundant production by complete fertilising every three years. The production begins in the year following that of transplantation; it is estimated at 170 quintals of leaves and 110 quintals of wood (branches) per year.

This system of culture has just been tried in the Mulberry plantations of the Silk-worm Rearing Institute of the Provincial Council of Agriculture in Trent, and the results have been exceedingly successful.

2698 **The Life of Mulberry "Meadows"** (Durata dei prati di gelso). — *Bollettino di Sericoltura*, No. 34, pp. 335-336. Milano, 26 Agosto 1911.

The average life of mulberry meadows is about 15 years, with a minimum of 12 and a maximum of 20 years.

Italy

Even if calculated according to the minimum limit, the cultivation of the mulberry on this system would yield a considerable margin of profit. The production of the leaf and its economic utilisation are in fact so extensive that they fully justify the renewal of the meadow which indeed lasts no less than twelve years.

(1) 1 quintal = 220.548 lbs.

On the other hand, there are a number of agriculturists who find it desirable to renew the meadows every 7 or 8 years, although they show not the slightest trace of decrepitude or falling off in production. The aim of these agriculturists is to utilise the surplus fertility accumulated in the soil during the vegetation of the mulberries.

Mulberry meadows are to be strengthened by phosphate, potash and nitrate fertilisers.

Forestry.

The Distribution of the Forests in the World. — *Revue des Eaux et Forêts*, T. 50. N. 16, pp. 505-506. Paris, 15 Août 1911. 2699

The *Économiste français* reproduces recent statistics showing the forest resources of the entire world, prepared by the Ministry of Agriculture in Washington (1).

The following are the figures, in hectares (2).

	Forest Area		
	Total	Per unit of population	Percentage of total area
Russian Empire:			
Russia in Europe . . .	188 167 000	1.74	36.3
Finland	21 262 000	7.60	54 4
Total . . .	209 429 000		
Austro-Hungarian Empire:			
Austria.	9 700 000	0.37	26.5
Hungary.	7 570 000	0.47	25.7
Croatia and Slavonia . .	1 525 000	0.46	35.95
Bosnia and Herzegovina	2 584 090	1.61	50.5
Total . . .	21 379 000		

(1) Cf. RAPHAEL ZON. *The Forest Resources of the World.* U. S. Department of Agriculture, Forest Service, Bull. 83. Washington 1910. (*Ed.*).

(2) The figures relating to Spain, Bulgaria, Servia, and India do not agree with those given some years ago in official publications. Cf. ITALO

Other European countries:	Forest Area		
	Total	Per unit of population	Percentage of total area
Sweden	20 379 000	3.93	48.6
Germany	13 970 000	0.25	25.89
France	9 720 000	0.25	18.5
Norway	6 820 000	2.83	21.00
Spain (1)	6 500 000	0.35	13.00
Italy	4 100 000	0.12	14.28
Bulgaria	3 050 000	0.97	30.00
Roumania	2 575 000	0.44	18.09
Great Britain and Ireland	1 225 000	0.04	4.00
Switzerland	865 000	0.27	20.6
Belgium	420 000	0.08	17.7
Servia	1 565 000	0.63	32.0
Others countrie	1 800 000		
Total	72 989 000		

Asia:	Forest area hectares	Percentage of total area
Russia in Asia	141 000 000	
India	60 300 000	24
Ceylon	2 730 000	
Japan	23 370 000	
Philippines	19 850 000	
Carried forward	247 250 000	

GIGLIOLI. *Malessere agrario ed alimentare in Italia* pp. 332-333. Portici, 1903.

The Portuguese forests were estimated at 561 660 hectares in 1867 (GIOV. CARLO SIEMONI, *Manuale teorico-pratico d'arte forestale*, Firenze, 1872, p. 535), a few years ago they were estimated 471 800 hectares, being 5.2 % of the total area of Portugal.

According to L. R. YOVANOVITCH, *L'Agriculture en Serbie*, Paris, 1900, p. 27, the forests of Servia in 1900 extended over 2 231 581 hectares. According to the *Statesman's Yearbook for 1911*, p. 1207, they occupied in 1904, 3 818 620 acres, or 1 545 014 hectares.

A few years ago the area of forests in British India and Burma was estimated at 26 160 453 hectares. The *Statesman's Yearbook for 1911* p. 138 gives the figure of 82 489 268 acres, or 33 375 158 hectares for the year 1908-1909.

For India, see also below Abs. 2704.. (*Ed.*).

(1) Cf. below, Abs. 2701 and 2718. The wooded area of Spain is said to be 5 600 000 hectares. (*Ed.*).

brought forward . . .	247 250 000	
Australasia:		
British Australasia (1). .	51 300 000	18.8
Africa:		
Natal, Transvaal, etc .	260 000	
Madagascar	10 100 000	10
Barbary States.	3 850 000	
Central Africa	90 000 000	
America:		
South America	214 000 000	
Antilles	17 250 000	66.6
Canada	324 000 000	38
Mexico.	10 000 000	5.1
Alaska	43 000 000	
United States.	220 000 000	29
Other countries.	2 800 000	
Total .	1 233 810 000	

Re-afforestation in Italy from 1867 to 1910. (Relazione sui rimboscamenti eseguiti in Italia dal 1867 al 1910). — *Boll. del Ministero di agricoltura etc. Parte Ufficiale.* An. X., Vol. II. Serie A, Fasc. 3, pp. 51-62. Roma, 15 Luglio 1911. **2700**

The Italian Ministry of Agriculture has gathered together, in the form of tables, the statistical figures of re-afforestation work carried out in Italy in 1910, and, in the lump from 1867 to 1910. **Italy**

In 1900 the Italian Ministry of Agriculture distributed gratuitously to corporations and private persons 15 631 720 plants and 8428.70 kilogrammes of seeds of the most esteemed forest species, a list of which is given in the tables.

Altogether, from 1867 to 1910 there were distibuted 177 622 068 plants and 134 098.70 kgs. of seeds.

Both the plants and seeds come from State Nurseries established in different parts of Italy, or from inalienable State Forests, or again from purchases made especially from the best home or foreign producers.

The tables give particulars of the re-afforestation carried out at the cost of the State, or with the latter's co-operation, by the provinces,

(1) Cf. below, Abs. 2705. The forests of the Australian continent are calculated at 39 285 000 hectares. (*Ed.*).

(2) 1 hectare = 2.4711 acres.

and supply data as to the number of schemes submitted and accepted, and also the expenses incurred by the State and private persons.

Thanks to the distributions of plants and seeds, the area covered with forest has increased by 29 325.29 hectares, which raises the total re-afforested area on the 31st December 1910 to 63 514 hectares.

2701 **Re-Afforestation in Spain**. (Repoblación forestal). — *La Información Agrícola*, No. 7, pp. 121-124. Madrid, 1 de Julio de 1911.

A Society «Los Amigos del Arbol», has just been founded in Spain, whith the object of promoting the movement for re-afforestation.

Spain The two following tables relating to importation and exportation of forest products into, and from Spain in 1910 may give some idea of the necessity of developing forestry in the country from the point of view of national economy.

Exports.

	Francs
Spirits of turpentine	5 259 459
Resins	2 559 041
Round timber	3 752 308
Boards	278 652
Casks	7 202 905
Cork, raw or worked	43 188 212

Imports.

	Francs
Paper pulp	6 024 075
Staves	6 905 630
Sleepers	1 683 694
Telegraph poles	3 626 930
Boards	33 477 224
Charcoal and wood	2 653 918
Cork slabs	2 334 276

The resin industry is developed chiefly at Segovia. The output of cork has considerably increased owing to the new improved systems of working adopted in Estremadura and Andalusia.

The wooded area is at present 5 600 000 hectares. According to the most recent calculations this area could be doubled, if a scientific plan of re-afforestation were followed, and the species of which the products are at present imported, were utilised.

MICHAEL GRABHAM. **The Fertility and Extinction of Forest Trees.** 2702
Nature, 7 September 1911, Vol. 87. London, p. 315.

The mountains of Madeira, though now practically denuded of trees, were once well-wooded.

Madeira, (Materia) the name given to it originally by the Portuguese, denotes the densely wooded condition of the island at the time of its discovery. **Portugal. Madeira**

The destruction of the forests began with the first colonists, nearly 500 years ago, and was accentuated during the Spanish occupation in the second century of the island history. No replanting whatever has been attempted since, nor have any effective measures been put in force to stay the progress of destruction. The population, moreover, has increased during the last fifty years from 75 000 to 150 000 people, and the land is everywhere being cleared and occupied.

Nevertheless, the introduction of *Pinus Pinaster* has, during the last 150 years, had an important influence on the preservation of the surviving native vegetation, and the tree has become established on the heights from 1 500 feet to 3 000 feet above the sea, in surprising vigour and profusion, supplying fuel and many requirements on which a more durable and valuable wood would be wasted,

The writer considers that no trust can be placed in the maintenance of a single species in vigour and fertility, and has taken many coniferous and other trees thither to test both quality and rate of growth, and thus their fitness to supplement or supplant present supplies. Many of the newcomers, *e. g.* Podocarpus, Widdringtonia, Libocedrus, Dacrydium, are not suitable for extensive plantation; but the Douglas fir, *Taxodium sempervirens*, *Abies Pinsapo*, *Cupressus macrocarpa*, are quite at home in their new environment and congenial soil, as are also *Pinus canariensis* and *P. longifolia*. *P. insignis*, however, in this latitude is pre-eminently worthy of general adoption at the elevation of 2 000 feet. Mr. Grabham received seeds of this species from Kew in Sir J. Hooker's time, and one of the trees from this source has attained a growth of more than 100 feet in twentysix years; he has besides a goodly patch of young trees sown ten years ago which already vary from 25 to 30 feet in height.

It is interesting to note that many of the Madeira trees which have become nearly sterile and almost extinct in the wild state become vigorous and abundantly fertile in cultivated ground.

Cerasus lusitanica, the weeping Juniper (*J. Oxycedrus*), *Phoeb barbusana* etc. are familar examples of reviving fertility in altere circumstances.

Specimens of the Madeira rare woods have been sent at inter vals to the museum at Kew, and amongst them the ebony-lik laurel wood of *Oreodaphne foetens*, the heavy wood of *Notelae excelsa*, (Oleacea) and a long hammock-carrying pole made of *Clethr* wood, are worth attention.

Clethra arborea is happily still quite common, and attractiv at this season with its abundant show of fragrant lily-of-the-valley like flowers.

2703 **Forest Protection in Turkey**. — *L'Echo forestier*, No. 1965, p. 307 Paris, 24 Septembre 1911.

Ottoman Empire

The Ministry of Mines and Forests in Turkey is taking steps t preserve against all inroads the forests which form part of the natura wealth of the country.

The forests in the Vilayets and Mutessarifats will be divided int zones, planned according to the extent of these forests. Every year a Ministerial delegate will inspect these zones. Regulation will be drawn up to that effect.

The adoption of these measures denotes a step forward. I may be hoped that an improvement in the state of the forests wil follow.

2704 **Forestry in India**. — *Statement Exhibiting the Moral and Materia Progress and Condition of India during the Year* 1909-10, No. 46 chap, VII, pp. 49-52, London, 1911.

British India

Systematic conservancy of the Indian forests is based on the Forest Act of 1878, which gave the Government powers of deal ing with private right invested in the State. Special forest laws have also been enacted for each province, and a staff of trained forest officers has been organized. Forest administration is based upon the principle that State forests should be administered for the public benefit ; they are worked, therefore, with a view of com bining all reasonable facilities for their use by the public with the protection necessary for their preservation as sources of fuel and tim ber and retainers of moisture in the soil. The forests are classified as « reserved », « protected », or « unclassed ». In the reserve areas,

the control of the forest Department is more complete than in the protected or unclassed forests. In the latter, the area of which cannot be precisely stated, are included large tracts of uncultivated land, especially in Burma, much of which probably will become agricultural land.

Among the most important measures of conservancy are the prevention, so far as possible, of the fires which are liable to devastate the forests, the plantation and reproduction of timber and firewood, the maintenance of a supply of seed-bearing trees and the regular production of timber of the more valuable kinds. At present the reserved (including leased) forests cover an area of about 92 000 square miles (258 000 sq. kmet); and there is scope for further reservation in Madras and Burma. Outside the reserves, there are about 157 000 square miles (341 000 sq. kmet) of State forests, including 16 000 square miles (47 000 sq, kmet) of protected forests. Some part of this area will eventually be brought within the « reserve » area, and all of it is, with more or less completeness. managed and worked for the benefit of the people, of their cattle and for the public revenue.

The limited areas of private forests, except where they have been leased to the government, are being gradually exhausted; and few private communal or village forests have been successfully brought under conservancy, In every province a very few of the most valuable timber trees are declared to be reserved trees, and can only be felled under special licence. Outside the reserves, the country folk are generally allowed to obtain from the State forests timber, bamboos, firewood, and grass for their own use without charge; inside the reserves, persons specially licensed are allowed to extract timber or other produce, on payment of fees, though all rights recognized by the forest settlements are preserved for the public.

Offences against the forest laws consist chiefly of illicit grazing and unauthorised felling or removal of produce. Forest revenues are raised by royalties on, or by the sale of, timber or other produce and by the issue at specified fees of permits to graze cattle, or to extract for sale timber, firewood, charcoal, bamboos, canes, and minor forest produce. The gross revenue derived from forests in 1909-10 was £1 735 400 (frs. 42 808 850), including £463 000 (frs. 11 589 750) and £1 165 200 (frs. 28 916 300) received for timber and other produce removed from the forests by government agency and by consumers (purchasers) respectively. The charges amounted to £1 006 700 (frs. 25 319 175), leaving a net revenue of £728 700 (frs. 17 489 675),

Some of the native States, such as Kashmir, Mysore, Travancore and Baroda, have also organised a systematic forest administration, from which they derive a considerable revenue.

The results of protection against forest fires have been satisfactory in the United Provinces, Burmah, Madras and Coorg; less so in the Central Provinces, Berar and Bombay.

2705 **The Forest Wealth of Australia.** (Der Holzreichtum Australiens). — *Das Handelsmuseum*. N. 2. S. 394-395. Wien, 22 Juni 1911.

The extent of the Australian forests is estimated at 97 000 000 acres, or 392 850 square kilometres. The production of 98 600 square kilometres suffices for the needs of the local population and local industry, and all the rest can be used for exportation.

Australia

The 97 000 000 acres (39 285 000 hectares) of forest are distributed as follows among the several States:

	Acres		Hectares
New South Wales . . .	20 000 000	=	8 100 000
Victoria	11 790 000	=	4 774 950
Queensland	40 000 000	=	16 200 000
South Australia	3 840 000	=	1 555 200
West Australia	10 370 000	=	4 199 850
Tasmania	11 000 000	=	4 455 555

These figures represent a minimum, and deal with the forests already being worked. There are in addition vast wooded territories still untouched, the extent of which is about 98 000 000 acres in West Australia and 14 300 000 in Queensland (1).

(1) The areas occupied by the principal trees of Western Australia, and the areas felled in two years are given as follows by the Official Industrial Returns:

	Acres	1908 Sq. ft. cut	1909 Sq. ft. cut
Jarrah (with blackbutt and red gum)	8 000 000	165 075 401	171 241 673 (*c*)
Karri	1 200 000	400 000	—
Tuart	200 000	357 000	234 600
Wandoo	7 000 000	24 000	243 990
York Gum, yate, Morrell, saudalwood, and jam . .	4 000 000	1	104 728 (*a*) (*b*)
Total . . .	20 400 000	165 856 401	171 824 991

(*a*) Exclusive of sandalwood, for which no industrial returns were supplied, but of which in 1908 a total of 9 564 tons. was exported, and in 1909 of 4 804 tons.

(*b*) Other timber, not specified.

(*c*) Jarrah only. (*Ed.*).

Owing to its climate, Australia, without Tasmania, chiefly produces hard wood.

New Zealand produces for the most part soft wood, which it supplies to Australia to the value of about £500 000 (12 625 000 fr.).

On the other hand Australia exports hard wood to the value of £90 000 (2 273 500 fr.).

The result of the abundance of wood is that farmers fell it without that foresight and consideration which will be necessary, in the future, to safeguard the species and the forests.

J. Osborne. **Tree Planting in Tasmania.** — *The Agricultural Gazette of Tasmania*, June, 1911. **2706**

Considering that the planting of trees is rendered necessary in Tasmania by the deforestation that has taken place since the advent of the first settler, the writer states that the great increase in the production of fruit renders the planting of trees for the box timber that will be required in the future, a necessity, since something like 10 million cases annually will be required by Tasmanian fruit growers if the present rate of planting orchards will be maintained. Instructions are given to farmers, and the following list of timber trees is recommended. **Australie : Tasmanie**

In Northern Districts :

Hillsides and Mountains.

Conifers.

Larch (*Larix europaea*).
Silver Fir (*Abies pectinata*).
Corsican Pine (*Pinus laricio*).
Mountain White Pine (*Pinus monticola*).

Lowlands and Gullies.

Conifers.

Douglas Fir (Oregon Pine) (*Pseudotsuga taxifolia*).
Bentham's Pine (*Pinus benthamiana*).
Weymouth Pine (*Pinus strobus*).

(1) See Abstr. 1796 *Bull.* June 1911.

In Southern Districts :

HILLSIDES AND MOUNTAINS.

Conifers.

Larch (*Larix europaea*),
Silver Fir (*Abies pectinata*).
Corsican Pine (*Pinus laricio*).
Mountain White Pine (*Pinus monticola*).
Norway Spruce (*Picea excelsa*).

LOWLANDS AND GULLIES.

Conifers.

Douglas Fir (Oregon Pine) (*Pseudotsuga taxifolia*).
Bentham's Pine (*Pinus benthamiana*).
Weymouth Pine (*Pinus strobus*).

We note among ornamental trees recommended :
Spanish Fir (*Abies pinsapo*) Menzies' Spruce. (*Picea sitchensis*).
Lofty or Bhotan Pine (*Pinus excelsa*).
Norfolk Island Pine (*Araucaria excelsa*).
Himalayan Cypress (*Cupressus torulosa*).
Japanese Cedar (*Cryptomeria elegans*).

2707 G. CAPRA. **Alpine Pasture Lands. Protection Due to the Forest in the Lys Valley in Piedmont, Italy.** (Studio tecnico economico di alcune Alpi della Valle del Lys). — *Annali della R. Accademia di Agricoltura di Torino*, Vol. 53, 1910, pp. 586-715. Torino, 1911.

A complete study of several typical Alpine pasture lands.

The equipment is as follows :

Italy : Piedmont

1. Masonry shelter, where cattle can be put in during the night and bad weather.

2. Natural hay reserves, mown by the shepherds during free time.

3. Irrigation and manuring ; distribution of manure.

4. Embanking and arranging the soil.

As regards deficiency of forests, the following ill effects have been observed :

1. Instability of the soil and landslips ; formation of non-cultivable land.

2. Encroachment on pasture land of waste due to rock disintegration.

3. Shortage of organic substances in the soil.
4. Dryness of pasturage and shortage of water.
5. Absence of regular rainfall; frequent showers and storms.
6. Hardness of grass, poor growth and reproduction, little variety.
7. Deficiency of wood and difficulty of obtaining fuel supply.
8. Reduction of period of grazing, often amounting to a month.

N. I. Crahay and Durieux. **The Use of Chemical Fertilisers in Forestry. Result of Experiments.** — *Bulletin de la Société Centrale Forestière de Belgique.* 18e A., 8e et 9e l., pp. 491-502 et 551-565. Bruxelles Août et Septembre, 1911. **2708**

This article deals with the use of chemical fertilisers in forestry. On the basis of their experiments in Belgium, the writers give the following interesting conclusions :

1. The different substances used for manure in agriculture, basic slag, kainit and lime, are, in certain cases, destined to render important service in the afforestation of waste lands, chiefly on poor soils. **Belgium**

2. In the present condition of our knowledge it is not possible to lay down absolute principles regarding the action of fertlisers in forest cultivation. This action varies according to the locality, soil, species, method of application, nature and quantity of the manure used, and it must not be forgotten that trees which are satisfied with poorer soils than agricultural plants, have a greater power of assimilation than the latter and explore deeper strata.

Furthermore, the forest vegetable mould, which is unrivalled in agriculture, is capable of modifying in a noteworthy degree the action of chemical fertilisers. Before using fertilising substances on a large scale it seems indispensable to carry out, on the particular estate, comparative experiments with a view to determining the most effective elements, as well as the most favourable quantities, method of use etc.

3. With the foregoing reservations, the writers believe themselves justified in pronouncing the following judgments in the light of the Belgian experiments :

(a) Lime has been found beneficial to the broad-leaved plantations in the relatively rich forest soils of Upper Belgium ; it is indispensable for the successful growth of broad-leaved trees in the sands of Lower Belgium, independently of green or, perhaps, mineral nitrogenous manure. It also seems destined to play a useful part in re-afforestation, in worked pine woods, with resinous species,

and also in the development of low-lying heaths containing raw humus with acid reaction. Finally, the experiments at Hertogenwald show that it is possible, thanks to the use of lime, to convert the peaty Hautes Fagnes, which have long been regarded as refractory to every development by afforestation, into spruce fir stocks.

b) Basic slag contributes an active component (phosphoric acid), which, in soils very poor in that substance, excercises a highly useful action. They furthermore appear to possess in a lesser degree an action analogous to that of lime, owing to the 50 % of that element which they contain. In sandy, dry soils, of a very permeable nature and not particularly acid, this fertilizer might be less active.

(c) Kainit and other potash manures combined with slag appear to promote the growth of plantations of both broad-leaved trees and conifers ; above all on lands poor in potash, especially the sandy, dry, high and very porous soils of the Campine.

(*d*) Nitrogenous manures, which have been very little tried up to the present owing to their high prices, should likewise be made the subject of prolonged observations. Independently of their nursery uses, it seems that conditions might occur where cheap nitrogenous manures could be very serviceable, particularly in poor sandy soils, in bringing about the formation of the tree crop in broad-leaved stocks. Experiments in this direction are in process of being planned. These considerations in no way detract from the importance of lupins for the improvement of the Campine moors.

4. The association of the different elements is desirable in the use of manures.

5. Tilling the soil is generally necessary, indeed indispensable, to facilitate the incorporation of the fertilizers and render their action more effective.

6. It is indispensable to spread highly divided fertilizers and to distribute them uniformly, particularly as regards lime.

2709 J. Helms. **Manuring Tests of a Stock of sickly Spruces growing on Heathland.** (Nogle Gødningsforsøg i sygnende Grankultur paa Hedejord). — *Tidsskrift for Skovvaesen,* B. XXIII, pp. 66-85 + fgs. 3.Kobenhavn, Februar, 1911.

Denmark In Denmark, in Spruce stocks growing on heath land, a cessation of growth was noticed after some years. This was supposed to be due to the absence of bacteria fixing the nitrogen in the soil, and treatment was proposed with inoculating earth, nitrate of soda'

lime, potash and basic slag. The writer, on the basis of the previous researches of Profs. P. E. Müller and Fr. Wies, proceeded to carry out a remarkable series of experiments with the object of contributing towards the solution of the important forest problem in question.

These experiments were conducted at Borbjerg, where, after two superficial ploughings, a deep one was made in 1889. In 1890 the spruces were planted; the heather was uprooted by ploughing and hoeing, the longitudinal divisions were planted with mountain Pine in lines, prepared beforehand to ensure protection of the plantations; the cross divisions were made by small furrows.

The first set of experiments was arranged during the autumn of 1901 as follows:

	A	B	C	D	E
1	No. treatment				
2	Heather uprooted	and improving with lime	and sodium nitrate	and lime, sodium nitrate and basic slag	As A
3	Plants hoed				
4	Weeding and inoculation earth	As A	As A	As A and kainit	

Each plot measured 0.0137 hectares. The ground lime was put down at the rate of 3685 kilogrammes per hectare; the inoculation earth at the rate of 9.70 hectolitres per plot; kainit at the rate of 545 kg. per hectare; basic slag at the rate of 363 kg., sodium nitrate at the rate of 182 kg.

The results observed in 1909 allow of the following conclusions:

1. Hoeing in the first year, produced an improvement in the colour of the plantations, which was maintained in the two following years. There was then a stoppage for two years, but during the last three years noteworthy progress was once more obtained.

2. The uprooting of the heather produced almost the same effect as hoeing, but in a lesser degree.

3. The lime had a good effect, not only on the colour of the Spruces but also on their growth. This effect only manifested itself after some years, but in return it was enduring. Furthermore the effect of the lime was more intense on the plots where the heather had been pulled up.

4. Sodium nitrate exercises a rapid and intense action on the colour of the green parts, particularly in spots where the soil has been worked and the heather pulled up. This action on the other hand is very slight on soil covered with heather, which proves to be an active competitor. The beneficial action of nitrate stops at the end of two years and the Spruces show a perceptible retrogression in comparison with those not treated with sodium nitrate.

5. With lime, nitrate, kainit and basic slag there was secured at the start an improvement of colour due to the action of the nitrate. Subsequently the effects correspond to those of simple lime treatment, except for the slight advantage of early initial growth.

6. The inoculating earth produced no effect, which confirms the opinion of Fr. Wies, according to which the nitrogen-fixing bacteria are present everywhere, above all on heaths and in forests, where they thrive when the conditions are suitable (1).

These conclusions are confirmed by the average heights stated in centimetres, of the spruces on the different plots.

	A	B	C	D	E	Average
1	53.2	56.6	65.6	71.4	59.2	61.2
2	48.0	67.1	75.3	79.5	71.8	69.1
3	59.2	81.8	81.7	84.9	76.9	76.9
4	59.9	83.8	76.7	88.8	77.8	75.6
Average	52.8	72.3	74.8	81,1	72.4	

A second set of experiments confirmed these results, namely that phosphoric acid and potash produced no effect, whilst nitrate is said to have overcome the yellowing ; this would confirm the hypothesis of P. E. Müller, according to which the cessation of growth of the Spruce is due to the insufficiency of nitrogen in the heath soil. Since, however, the action of the nitrogen was brief, whilst that of the lime was durable, it would show that the lime liberates the combined nitrogen o the soil, or that it promotes the vitality of the nitrogen-fixing bacteria.

(1) Cf. also the experiments of Henry at Nancy, regarding fixation of nitrogen in the forest soil (*Journal d'Agr. Prat.* 1907, I, 549, etc.) (*Ed.*).

A third set of experiments was carried out with litter of mountain Pine needles. In 1905 three plots were taken : the first was not treated ; on the second the heather was pulled up ; on the third likewise, but, in addition, it was covered with needles in greater proportions than the natural covering from a mixed culture of Spruce and Mountain Pine (1).

	Plot I cm.	Plot II cm.	Plot III cm.
Average height	45.3	47.6	72.8
Average length of the three longest apex shoots . . .	8.8	15.0	34.5

In August 1909, the following results were observed :

The evident usefulness of the cover of pine needles is likewise confirmed by the colour of the plants. This would explain why the better condition of growth of certain plants in sickly heath-growing stocks is due to the layer of needles maintained around the plant by the lowest branches, which are partly in complete contact with the soil.

A. Huffel. **Forest Yields in Germany.** (Le mouvement Forestier à l'Etranger - Allemagne : Prix des Bois, Statistique) (2). — *Revue des Eaux et Forêts.* No. 18, p. 552. Paris, 15 Septembre 1911. **2710**

The German Forestry Association (*Deutscher Forstvercin*) has for the last eleven years published a Bulletin which appears from six to eight times per year, dealing with the year. A special number, edited by Professor Dr. Schwappach, contains statistics of forest yields in the Empire. This number 1908, appeared in June 1910. Its figures refer to the whole of the State Forests, 69 % of the communal forests and 12 % of the private forests, that is, in all to an area of 7,629,000 hectares or 54.5 % of the total of German forests. **Germany**

The following table sums up the particulars of production in relation to the State forests in the six countries possessing more than 100,000 hectares of these forests.

(1) Mountain Pine - *Pinus Pumilio*, Henck. Gerth van Wijk. *Dictionary of Plant Names.* The Hague, 1911. (*Ed.*).

(2) For Württemberg, see Abstr. 858, *Bull.* March 1911.

STATES	Area of Forests in thousands of hectares		Produc. of timber of more than 2 decim. girth per hectare of forest	Proportion in the Returns			Yield of timber and small wood per hectare of forest	Total yield per hectare of forest
	Total	wooded		timber	broad leaved wood	resinous wood		
			cubic m.	%	%	%	cub. m.	cub. m.
Prussia	2 952	2 641	3.75	63	29	71	0.79	4.54
Bavaria	937	824	3.87	53	»	»	0.60	4.47
Württemberg	196	187	5.95	63	28	72	1.22	7.17
Saxony	180	173	5.23	83	4	96	1.32	6.55
Alsace-Lorraine	155	152	3.27	46	55	45	0.60	3.87
Mecklenburg - Schwerin	109	99	3.47	38	44	56	1.48	4.75

COUNTRIES	Per Hectare of Forest						Per cubic metre		Ratio of expenses to gross revenue
	Total yield	Expenses				Net Revenue	Average selling price	Working expenses (2)	
		Staff	Reaffo-rest-ation	Clear-ance paths	Total Ex-penses				
	marks(1)	marks	marks	marks	marks	marks	marks	marks	%
Prussia	42.39	7.10	1.79	1.82	18.86	23.53	9.85	1.32	44
Bavaria	48.65	7.13	2.28	2.05	22.39	26.26	11.93	1.63	46
Württemberg	103.98	10.51	2.72	4.29	37.34	66.64	14.16	1.80	36
Saxony	91.48	13.59	2.39	4.17	34.41	57.07	14.16	2.02	39
Alsace-Lorraine	50.06	7.48	1.85	2.06	25.64	24.42	12.36	2.27	26
Mecklenburg - Schwerin	44.29	7.60	5.73	»	20.40	19.90	8.45	1.19	51

This time once more, as in previous years, Württemberg holds the record of production. The 187,261 hectares of State forests (wooded

(1) The value of a Mark at par is 11 3/4 *d.*

(2) Cost of felling, dressing and clearance of forest (*Ed.*).

area) yielded 1,343,000 cubic metres of wood or 7.17 cubic metres per hectare; and 19,766,000 marks or 103.98 marks per hectare. The region of Upper Swabia contains 22,727 hectares of State forests, nine tenths of which are stocked with fir or spruce, and one tenth with beech and oak. In 1908 they yielded 10.76 cubic metres per hectare. This figure is not accidental; it was 11.98 cubic metres in 1907. These are the most productive forests in the German Empire. They can stand comparison with the best fir woods in the French Jura. The gross return in money at times exceeds £ 10 per hectare and the price per cubic metre of resinous timber averages nearly £ 1 for the whole.

W. D. STERRETT. **Scrub Pine (*Pinus virginiana*, Mill.).** — *U. S. Department of Agriculture. Forest Service Bull.* 94, 27 pages. Washington, July 22, 1911. 2711

This species is especially adapted to sterile soils and worn-out farm land. It is a fairly rapid grower in early years, but as a rule is short-lived, and does not reach large dimensions. It reproduces itself with the utmost ease, and rapidly extends over idle cleared land wherever seed trees are at hand. Since the prevailing growth of the species is small, the wood is principally used for fuel, pulp wood, and charcoal. Wherever it is large enough, it is cut for lumber for local consumption which is the most profitable use for such timber. Trees of the species which have come up in open stands have little value; the growth must be in fairly dense stands to be of commercial value. The species is better adapted for pulp wood than are the more resinous yellow pines. It has also been successfully used for railway ties, and could be greatly improved for this purpose by creosoting, to which it is very well adapted. United States

Forest management, as a rule, is advisable for pure second-growth scrub-pine land, where the land is of little value for agricultural or other purposes.

Such stands can be easily reproduced, and yield a fair revenue after cutting.

A short rotation of 30 to 40 years is silviculturally and financially preferable to a long one. Scrub pine is adaptable to management for a sustained annual yield. Improvement thinnings are advisable wherever they can be made to pay for themselves. The natural or artificial extension of scrub pine over additional areas of worn-out farm land or barren land is sometimes advisable where seed trees are abundant, and natural seeding will take place, or seed

can be collected at small cost, and where it would be difficult or too expensive to secure the growth of trees.

On the other hand, where scrub pine competes with more valuable species for occupation of the soil, as it does with shortleaf pine in parts of Virginia, it should be eradicated as much as possible and prevented from seeding up cut-over areas or abandoned agricultural land.

2712 M. JON SIVERS. ***Pseudotsuga Douglasii*** (1) **and its Importance to Steppe Forestry in Russia.** (Duglasova Pikta i eià Suaceuie v liesnom Khosiaistrie Rossii). — *Liesnoi Journal* (Journal of Forestry), XLI G., Vep. 1-2, pp. 204-208. St. Peterburg, Janvar-Fevral 1911.

Russia

The low humidity of the soil of the steppes and the continental character of the climate — very cold winters and very hot summers — render the cultivation and growth of *Picea excelsa* Link. and of *Pinus sylvestris* L., the two conifers which are most widely cultivated in the northern regions of the Empire, impossible over a great part of Russia.

The necessity for finding a conifer supplying good and abundant wood, and at the same time thriving in the steppe region therefore becomes a problem of the utmost importance.

Good results could no doubt be obtained for this purpose by cultivating on a large scale *Pseudotsuga Douglasii*, as has already been tried with success in various places in Western Europe.

In North America, *Pseudotsuga Douglasii* forms very fine and dense forests along the Pacific coasts as well as in the remotest regions of the interior, where an essentially continental type of climate similar to that of Central and South Eastern Russia predominates.

This plant stands fairly low temperatures and drought very well. In addition, it is resistant to gusts and squalls and is immune from the attacks of numerous cryptogamic diseases and minor insects.

The wood it produces is compact, strong and almost proof against rotting, and is as well adapted to building purposes (railway sleepers, beams etc.) as to the cellulose industry.

The author insists on the necessity of importing large quantities of seeds immediately in order to establish experiment nurseries, which will enable plants to be distributed abundantly, through the various localities of the Russian Empire.

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(1) Cf. Abs. 170 *Bull.* Jan. 1911; Abs. 495-496 *Bull.* Feb. 1911; Abs. 869 *Bull.* March 1911. (*Ed.*).

The Argan Tree. — *Scientific American*, Vol. CV, No. 9, p. 183. New York, August 26, 1911. 2713

Among the most remarkable trees of the world is the argan (1), which abounds in Southern Morocco, but is seldom seen elsewhere. A " forest " of argans has a curious scattered appearance, because the trees grow singly and far apart. They are very leafy, but seldom exceed twenty feet in height. The branches put out horizontally, and begin a yard above the ground. Sheep, cattle and camels feed on the leaves, and goats will stand on their hind legs to reach them, but horses and mules refuse to touch them. The wood is very hard, and extremely useful to the natives, who make charcoal from it. The fruit, resembling a large olive, is used to feed cattle and to manufacture a valuable oil. It also furnishes the principal sustenance of many of the poorer natives. Morocco

Use of Dum Palm Nuts as Vegetable Ivory. — *Bulletin of the Imperial Insitute*, Vol. IX, No. 2, pp. 105-110. London, 1911. 2714

The nuts of *Phytelephas macrocarpa* of South America have long been used as a substitute for ivory, and are regularly imported into Great Britain under the names of " corosos nuts ", " ivory nuts " or " vegetable ivory ", for use in the manufacture of buttons and other small articles. The nuts of certain species of *Coelococcus* (2) are also imported from Polynesia to be used in like manner. In the last few years the price of " corosos nuts " has much increased, and, as a result, a demand has arisen for dum palm nuts as a substitute. So far, these nuts have been used chiefly in Italy and Germany. The imports to Italy now amount to from 2 500 to 3 000 tons per annuum, and the nuts fetch about £ 8 per ton. Although the principal supplies appear still to be derived from Erythraea and Abyssinia, some are obtained from the Anglo-Egyptian Sudan (600 tons exported in 1910). S. America Erythraea. Abyssinia. Sudan.

The dum palm nuts, however, are not so good as " corosos nuts " as they possess a large central cavity which in most cases has proved a great hindrance to their use. The presence of the

(1) *Argania Sideroxylon*, Roem. et Schult., Sapotaceae, growing in Morocco (Index Kewensis). (*Ed.*).

(2) According to the *Index Kewensis* the name of this genus of palms is a synonym of *Metroxylon*. (*Ed.*)

cavity involves a considerable waste in cutting and, in addition, the material cannot be polished to a sufficiently fine finish.

The Hyphaenae included under the name " Dum palm " and their distribution are discussed by O. Beccari in *L'Agricoltura coloniale*, 1908, No. 2, p. 137. This author concludes that there are at least 42 species included in this genus, and that these occur throughout tropical and subtropical Africa, from Natal to Central Eyypt and from Senegal to Cape Guardafui. Of these species he regards 3 as producing nuts suitable for use as vegetable ivory, viz *H. nodularia*, which is much the best, and *H. benadirensis* and *H. mangoides*, which both yield inferior but still possibly useful nuts.

2715 GRANGEON. **The Forests of Tapia *(Chrysophia macrophylla)*** (1). — *Colonie de Madagascar et Dépendances, Bulletin économique*, 10e année, No. 2, pp. 181-185. Tananarivo, 2e semestre, 1910.

Madagascar

The Tapia forests are a source of appreciable revenue to the Colony of Madagascar. The native silk-worm or « Landibe » (*Borocera madagascariensis*) feeds on the Tapia leaf. The right of gathering cocoons in the Tapia forests is granted to private persons by way of adjudication. The price for the last adjudication was 40,000 francs for the province of Ambrositra ; in 1906 it was about 28,000 frs. The area occupied by the Tapia forest is at least 100 000 hectares, for the province of Ambositra alone. The area covered by Tapia diminishes from year to year.

The writer enquires into the cause of this progressive destruction and the means of remedying it.

The causes of destruction of the Tapia are : fires (until recently the natives every year after the harvest burnt the grass of the Tapia forests, wrongly thinking that they in this way destroyed the insect enemies of the Landibe silk-worm) ; the barbarous method adopted for gathering the Landibes ; the insect enemies of the Tapia. Though the damage caused to the Tapia by the Landibe itself is inconsiderable, there are other lepidoptera, which, owing to

(1) TAPIA = *Chrysophia macrophylla*, Camb. (Guttifera). A shrub with edible fruit, the leaves being used by natives for rearing the wild silk-worm (*Borocera madagascariensis*). The stock furnishes the best product for mixing with snuff tobacco to improve its sternutatory properties. The resin flowing from the trunk is green, ductile and aromatic. (E. HECKEL, *Les plantes utiles de Madagascar*; p. 215, Marseille-Paris, 1910).

their large number completely strip the trees of their leaves. Two of these lepidoptera are the most dangerous. One of them, called « Saroa » by the natives, is of a species akin to the *Borocera*. It produces cocoons 1.5 cm. long of yellowish brown silk. The second, known to the people of Madagascar under the name of « Miana », forms small round wood-coloured cocoons of a chitinous character. It appears very difficult to combat these insects. The damage, which is sometimes very great, remains localised in certains regions.

Various causes of destruction operate upon the « Landibes ». Birds, particularly crows, destroy the caterpillars and even the cocoons themselves to get at them. Spiders, certain classes of bugs and finally various hymenoptera also destroy the « Landibe ». The hymenoptera cannot injure the crop because the caterpillars attacked finish their cocoons. Nevertheless the microgasters are able to cause extensive damage, because they kill the caterpillars.

The diseases attacking *Bombyx mori* also assail the Landibe. Flacherie and muscardine do not cause great injury in the Tapia forests, but pebrine produces serious ravages in some regions.

In order to repopulate the Tapia forests with Landibes and increase the cocoons, cellular rearing must be carried out. Perhaps there also exist in some parts of the province of Fianarantsoa cultures of Landibe on Pigeon Pea (1) immune from Pebrine. This might be ascertained by the microscope, and the eggs from these cultures might be used.

E. CHIOVENDA **A Plant of Northern Abyssinia Producing the " Wars ".** **2716**
(Di una pianta dell'Abissinia settentrionale che produce *Wars*). — *Annali di Botanica*, Vol. IX, Fasc. 3, pp. 345-346. Roma, 31 Luglio 1911.

Abyssinia: Harrar

It is well known that the orange red dyeing substance known under the name of " Wars " is obtained from the glandular hairs

(1) *Cajanus indicus* Spreng. On the coasts of Madagascar the Pigeon Pea attains the proportions of a shrub; in the interior it is smaller. It is cultivated less for its seeds, which, when fresh, are palatable as vegetables, than for home rearing of silk-worms. The buds are pectoral, the flowers are good for allaying cough, and the juice of the leaves is laxative. The ash lye is a detergent. The negroes of Guinea, powder themselves with the seed flour to conceal recent pustules. E. HECKEL, *Op. cit.*, p. 22.

The *Cajanus indicus* « Pigeon Pea » is also cultivated in the West Indies and in India. In the latter country it is cultivated in rotation with cereals. (Sir G. WATT, *The Commercial Products of India*, pp. 196-200, London). (*Ed.*).

covering the pods of the *Flemingia rhodocarpa* Baker, discovered in Zambesi.

There was afterwards discovered in Harrar a leguminous plant determined as *Eriosema erythrocarpon*, the pods of which carry glandular hairs from which the natives extract a dye substance which they call " Wars ", " Wurus " or " Wurs ".

The writer, in his journey through Northern Abyssinia in 1909, collected specimens of flowers and fruits of *Eriosema robustum* Baker, the valves of the pods of which are covered with a dense, flowery, ruddy-brown down, formed by an innumerable number of glandular hairs.

In view of the affinity of the genera *Flemingia* and *Eriosema*, it may be believed, according to the writer, that the three plants bearing the " Wars " on their pods are only one and the same species, although from their descriptions they appear really to be different, all three. Nevertheless the writer points out that the habits, and particularly the ribbing of the leaves of *Eriosema robustum* are precisely the same as those of *Flemingia*.

It is not known whether the natives of Abyssinia use it for dyeing.

2717 ***Laportea pterostigma*. The Stinging Tree of Formosa**. — *The Gardeners' Chronicle*. Vol. XLIX, No. 1263, p. 154. London, 11 March, 1911.

Japanese Empire: Formosa

In the course of an interesting communication to *Nature* (March 2, 1911), Mr Tokutaro Ito suggests that an appropriate name for the Formosan Stinging Tree (*Laportea pterostigma*) would be Mamushi-no-ki or Viper Tree. Contact of the leaves of this tree with the skin produces maddening pain, which lasts a day and a night, and hence it well deserves the old Chinese name which signifies Man-biting-dog. *Laportea pterostigma* reaches a height of about 10 feet, has long and large leaves resembling those of the Tobacco plant, and is provided — needless to say — with stinging hairs. Other species of the genus *Laportea* which belongs, like the Stinging Nettle (*Urtica dioica*), to the *Urticaceae*, also possess this remarkable property. Thus, as described in *Nature* (1882, xviii., p. 465) *Laportea crenulata*, the Stinging Tree of Queensland, produces even more agonising effects than those ascribed to *L. pterostigma*: " Its effects are curious. It leaves no mark, but the pain is maddening, and for months afterwards the part, when touched is tender in rainy weather or when it gets wet in washing, etc. I have seen a man who treats ordinary pain lightly, rolling on the ground in agony

after being stung, and I have known a horse so completely mad after getting into a grove of the trees that he rushed openmouthed at everyone who approached him, and had to be shot. Dogs when stung will rush about whining piteously, biting pieces from the affected parts".

Mr N. E. Brown has also described, in the same number of the *Gardeners' Chronicle* that contains the above account, his personal experience of the virulence of the sting caused by plants of *Laportea crenulata* grown in the Palm House at Kew (1).

The Queensland Timber Industry. — *Journal of the Royal Society of Arts*. No. 3068, p. 992. London, Sept. 8, 1911. 2718

The forest resources of Queensland are extensive, amounting to 40 000 000 acres, or 9.32 per cent. of the whole area of the State, while 3 836 191 acres, or 0.89 per cent are specially reserved by the Government for timber. The forests of Queensland yield a great variety of woods noted for strength, durability and beauty. The eucalyptus dominates the forests which also contain iron bark, grey, spotted, and red gum, black butt and turpentine. The conifers, too, are numerous, including Moreton bay and brown, and bunya-bunya pines. Among the brush timbers of fine grain are red cedar, beech, tulipwood, and rose wood. In the extensive plateaus west of the dividing range off from the coast, there is but little timber, aud in the vast basin of the interior usually only stunted eucalyptus trees are found. The quantity of timber cut and sawn in Queensland in the latest year for which the particulars are available, was 100 760 000 superficial feet, valued at £6 600 000. **Australia : Queesland**

The Artificial Seasoning of Timber. — *Journal of the Royal Society of Arts*, No. 3058, p. 826. London, June 30, 1911. 2719

The amount of timber seasoned by artificial means increases every year. Nor are the results of the artificial process, if carefully managed, inferior in any way to those of the natural operation. Indeed it is claimed that timber artificially dried absorbs less moisture from the atmosphere than that which is dried naturally. A great **Great Britain**

(1) *Laportea crenulata* of tropical Asia yields a strong useful fibre used in Assam for cordage, and in the manufacture of a coarse cloth. Cf. G. WATT. *A Dictionary of the Economic Products of India*. Vol. IV, p. 558. (*Ed.*).

amount of technical skill is required in the management of the drying-kilns. Dry, warm air would crack and twist the green timber. In the early stages of drying, the air must be saturated with moisture and only dry in the final stages.

The arrangement of the most modern kilns is as follows:

A long closed-in building, capable of holding several thousands of cubic feet of timber, say from 20 000 to 50 000, has a floor laid with rails sloping gently from the end at which the timber is loaded in on trucks, to the end opposite where it is discharged. On one side of the building next the discharging end a fan draws in air over the surfaces of a steam heater, and sends it warmed into that end of the building, whence it traverses along to the loading end, passing in its course between the boards or planks, which are separated about an inch apart by narrow strips of wood laid across at intervals of about two feet. The moisture in the timber is taken up by the warm air first at the discharge end of the kiln, and is deposited again on the timber at the loading end. Thus the saturation of the air increases in its passage from one end to the other, and its volume, intensity of pressure and temperature diminish also.

Entering the kiln as a dry, warm current, it leaves it as a moist, cooled current.

The effect on the timber is to remove moisture from the piles at the discharge end and to deposit moisture on those at the entering end; it is taken, therefore, from the timber which is driest and yielded up to the timber that is greenest.

In less-pronounced degree the same process is going on all through the length of the kiln.

2720 W. SOMERVILLE. **Increasing the Durability of Timber.** — *The Journal of the Board of Agriculture*, No. 4, pp. 281-287. London, July, 1911.

It has been long recognised that much may be done to increase the durability of timber. Of the various methods that are employed for this purpose, that which at present occupies the foremost place is the application of creosote. This substance owes its efficacy to the fact that it is a virulent plant poison, so that wood which contains a considerable quantity of creosote is more or less completely protected against the attack of decay-inducing organisms such as fungi. Many other substances besides creosote have been used as preservatives, such as copper sulphate, zinc chloride and

corrosive sublimate, but either on account of their cost, or because they are poisonous to animals, are easily washed out by rain, or corrode metal, they have all been supplanted more or less completely by creosote, except in countries where this substance is much dearer than in Britain.

On a large scale, creosote is usually applied under pressure, and this process entails the provision of a somewhat costly plant.

The amount of creosote or other fluid that wood will absorb varies greatly according to species and circumstances. The wood that is subjected, more than any other, to the process of creosoting is Baltic Yellow Deal, otherwise known as Baltic Red Wood, which is precisely the same species as Scots Pine.

The great value of creosoting for farm purposes is that it prolongs the « life » of low-class timber so as to enable such material to be used for fencing and other purposes.

Immersion in hot creosote for eight or nine hours will confer on wood most of the benefits got from two or three hours' treatment in a pressure chamber.

F. Main. **The Importation of Tropical Timber into France.** — *Journal d'Agriculture Tropicale*, XI Année, No. 121, pp. 203-207. Paris, Juillet 1911. **2721**

France in 1908 used in imported timber alone, 1,873,253 tons of common timber, 314,204 tons of wood pulp and 133,547 tons of exotic timber, besides the whole of its natural production. The forests of the Ivory Coast and those of Laos and Cambodge might solve the problem of the shortage of wood due to deforestation, from which France is suffering, like the majority of the nations of Europe. **France Indo-China Ivory Coast**

The commercial difficulty however of getting the consumers to make use of timber, the value and the qualities of which they do not yet know, has suggested to M. Main the idea of arranging the working of these timbers so as to get them quoted on the existing markets.

For this purpose he proposes to make, as it were, a commercial inventory of the forests, by having tests carried out, of turning, polishing, planing, sawing etc., by manufacturers, and on a large scale, rather than in laboratories and in scientific stations.

The writer has already obtained the adhesion of enlightened manufacturers, who have placed themselves at the disposal of the producers, on condition that a sufficient quantity is supplied to them, to make the tests practical and conclusive.

The forests of tropical countries contain, in addition to valuable woods, common species fit for the same uses as those of the forests of Europe. It is these woods, chiefly, which it is desired to make known, the more so because for these tests the cost of felling and clearing are often considerably reduced, as common trees are often cut down to allow the felling and removal of more valuable wood.

Instead of rotting in the forests owing to ignorance of their real worth, it will be possible, at the trifling expense of the transport of a small quantity of their wood, to ascertain its commercial value.

2722 **The Utilisation of Wattle-Bark.** (***Acacia* spp.**) — *Bulletin of the Imperial Institute.* Vol. 9, No. 2, pp. 116-121. London, 1911

S. African Union: Natal

The area under wattle has been extended in Natal, and the cultivation of wattle-trees has been undertaken in British and German East Africa and elsewhere. It is clear from the following table, showing the exports of wattle-bark from Natal, Cape Province, and the Australian Commonwealth in recent years, that the production of this substance is increasing rapidly.

	Natal		Cape Province		Australian Commonwealth (1	
	Weight	Value	Weight	Value	Weight	Value
	Cwt	£	Cwt.	£	Cwt.	£
1906 . . .	295 130	89 056	1 437	318	431 896	162 453
1907 . . .	476 786	131 873	9 616	2 514	358 167	132 342
1908 . . .	491 748	133 510	5 233	1 053	260 364	102 410
1909 . . .	705 848	192 950	9 572	1 746	—	—

Value in Metric Measures:

	Natal		Cape Province		Australia	
	Weight	Value	Weight	Value	Weight	Value
	Qx.	Fr.	Qx.	Fr.	Qx.	Fr.
1906	149 926	2 248 664	708	8 029	219 403	4 101 938
1907	242 207	3 456 043	4 880	63 478	181 949	3 342 635
1908	249 808	3 371 127	2 658	26 588	132 265	2 585 852
1909	348 571	3 861 987	4 862	44 086	—	—

(1) These figures are for "tanning materials" and may include some mallet bark (*Author's note*).

Most of the wattle-bark received in Europe is at present used in Germany and the imports of wattle-bark in Hamburg in 1909 amounted to 426 982 cwt. valued at £ 195 398.

The analyses quoted in the following table were made at the Imperial Institute.

Name	Origin	Tannin %	Non tanning matter	Ash	Moisture %
Acacia decurrens	Natal . . .	52.2 to 39.8	7.3 to 10.3	1.5 to 2.8	9.5 to 11.7
» »	Cape , . .	40.1 to 44,1	7.1 to 13.0	1.5 to 2 8	10.1 to 10.9
« »	East Africa	36.7 to 42.1	9.4 to 12.7	1,5 to 2.4	10.2 to 13.0
» «	Australia .	38.3	4.4	—	11.1
Acacies pycnacantha	South Australia	40.2 to 49.5	9.0 to 9.4	—	11.2

These figures show that the wattle-barks from all these countries are rich in tannin, and this is confirmed by Paessler's statement (*Collegium*, 1911. p. 76) that the results of analyses of 260 samples of wattle-bark made at the *Versuchs-Anstalt für Lederindustrie zu Freiberg*, in recent years, gave on the average 31.5 per cent of tannin. Paessler points out that, apart from its richness in tannin, wattle-bark has the advantage of containing only 30 to 35 parts of non-tannin extractive matter to every 100 parts of tannin, and the quantity of sugars ln this non-tannin extractive matter corresponds to about 3 parts for every 100 parts of tannin, whereas in oak-bark the sugars amount to 26 parts and in hemlock-bark to abont 32 parts to every 100 parts of tannin. Liquors made from wattle-bark are, therefore, far less prone to fermentation than those from most other tanning materials. The same expert has investigated the actual relative cost per unit of tannin for the principal tanning materials, and his results are summarized in the following table:

Name of material	Average value of raw material per 100 kg. Shillings	Average quantity of tann. present Per cent.	Average cost of tann. p. kg. — Shillings
Oak-bark	10.5	9	1.17
» extract	25.0	25	1.00
Valonia	25.0	27	0.93
Quebracho wood	12.0	19	0.63
Divi-divi	24.0	28	0.63
Myrobolans	15.0	30	0.50
Mangrove-bark	15.0	38	0.39
Wattle-bark	20.0	33	0.61

To sum up, wattle bark presents the following advantages: (1) it is being produced in increasing quantities, so that there is no danger of a failure in supply, (2) it is being cultivated in several different countries, so that no monopoly in production is likely to occur, (3) it presents, as marketed, very little variation in quality, (4) it is rich in tannin, (5) it is cheaper than good tanning materials of similar quality and properties, (6) the tannin it contains is easily extracted, (7) the bark can be extracted and used with great advantage in admixture with other materials, and (8) whilst it is best suited for tanning heavy leathers, it can be used for certain kinds of light leathers.

2723
Turkey

Production of Valonea at Smyrna. — See above, Abstr. 2395.

2724

Mary Burchard Orvis. **Getting the Most out of our Wood Products.** — *The American Review of Reviews*, Vol. XLIV, N. 3, pp. 334-338; New York, September, 1911.

The Forest Service has estimated that 49 per cent, of the logs that reach the sawmill is lost in the form of slabs, trimmings, edgings, sawdust, and bark. In addition to this mill waste, forest products
United States
are subject to the ravages of decay, fire, insects, and marine borers, when put into commercial use, to the extent of about 740,000,000 cubic feet annually.

The Forest Products Laboratory. — The elimination of this waste in wood products is the problem of the United States Forest Products Laboratory, which was dedicated at Madison, Wisconsin, June, 4, 1910 (1).

The technical work of the laboratory is done by the following departments: Timber Physics, Timber Tests, Wood Preservation, Wood Distillation, Wood Pulp, and Chemistry.

Chemistry. — Wood chemistry is closely allied to distillation, as it, too, is concerned with the by products. It is making a special study of methods of producing rosin and turpentine, since the processes now employed are very wasteful to standing timber. An effort is being made to find a substitute for the longleaf pine of the South, which is the main source of our turpentine supply. Since one tree lasts only four years as a producer of turpentine, it may easily be seen

(1) Cf, Abstr. 77, *Bulletin*, Febr. 1911. (*Ed.*).

that the supply cannot keep up with the demand for this species of tree. But it has been learned that the Western yellow pine (1) can be utilized in the same way as the Southern, and the Forest Service is carrying on experiments in California and Arizona, to determine how much rosin and turpentine can be obtained in one year from a Western pine. There is also the possibility of using other conifers of the West.

One important work that is being done is the classifying of the different kinds of creosote obtained from tars, as to their chemical and physical properties. At present the United States is importing most of its higher grades of preserving oil from Europe, because its own tar-paper industry consumes most of the coal tar by-products, of which creosote is one. The Forest Service is endeavouring to obviate the necessity of importing creosote, and is testing about two hundred different tars obtained from coal, wood, and oil gas plants. The samples are sent to the laboratory, whose business it is to see which ones will yield the best preservatives when distilled. When the experiments have been completed, a report will be issued that will be invaluable to consumers of creosote in the United States.

A very interesting branch of the work of this department is the production of ethyl alcohol from material that would otherwise be wasted. This alcohol, which is the same as grain alcohol, is fermented from sugars produced by the action of acids on wood fibre. The process makes use of the waste of forest and sawmill. The Forest Service has estimated that of the volume of trees cut in the United States for lumber, 25 per cent. is left in the woods, as culled logs, tree-tops, and stumps ; 16.5 per cent. is wasted in slabs, trimmings, etc. 10.5 per cent. in sawdust, and 9.8 per cent. in bark. This makes the startling total of 62 per cent. utterly wasted. If the process of distilling alcohol is perfected, however, this enormous waste will cease, and instead of a small part, nearly the whole tree will be utilized.

Wood Pulp. — The Wood Pulp Department is concerned with the paper industry, which ranks fifth in the United States in the value of product. The total capital invested in the industry is about $ 200,000,000 and the wages paid to American workmen nearly $ 140,000,000 annually. This huge industry is making alarming inroads upon our supply of spruce, which is far too valuable as a structural timber for us to allow it to be entirely used up in the manufacture of paper. The aim of the laboratory here, as in other branches of the work, is to find a cheaper substitute, and to prevent the destruction of an important wood.

(1) *Pinus Ponderosa* Dougl. (Cf. GERTH VAN WIJK, *Dictionary of Plant-names*, p. 1008, The Hague, 1911). (*Ed.*).

The laboratory has a miniature pulp and paper mill, which is making experiments in the use of other woods than spruce, such as hemlock, and the scrubby « jack pine », which is found in large quantities in Michigan, Minnesota, and Wisconsin. Until recently this tree was looked upon as a « forest weed » and considered worthless commercially on account of its short life when cut and put to structural use.

Congress recognized the importance of the pulp and paper work when it appropriated $ 30,000 for a branch laboratory at Wausau, Wisconsin, the purpose of which is « To determine if it is possible to produce a commercial grade of ground wood from other species of wood than spruce, which will be suitable for the production of news, wrapping and other cheaper grades of paper ». The Wausau laboratory is co-operating with the different paper companies of Wisconsin, which are represented by a committee from the National Pulp and Paper Association. The woods to be used experimentally are, the yellow birch, white birch, maple, poplar, jack pine, and hemlock. Success in substituting them for spruce will prolong the supply of raw material for the paper industry indefinitely ; and that means, not only conservation, but cheaper paper for the people of America.

2725 **Turpentine-Oil and Rosin from India**. — *Bulletin of the Imperial Institute*, vol. IX, No. 1, pp. 8-11, London, 1911.

Samples of turpentine oil and of rosin (colophony) were forwarded to the Imperial Institute from Naini Tal, United Provinces.
Brit. India The oil had been prepared from the oleo-resin of the « chir » pine (*Pinus longifolia*).

The results of examination were as follows :

	A	B
Specific gravity at 15°/15° C	0.871	0.868
Optical rotation in 100 mm. tube	— 0° 45'	— 2° 10'

The samples were subjected to fractional distillation.

They most nearly resemble Russian turpentine oil, whilst they are quite different from American turpentine oil, which yields not less than 70 per cent. by volume between 155° and 160° C. The product was valued at £27 10s. to £40 per ton in London. It could be used in place of Russian oil, which is widely employed for the cheaper grades of varnishes, for black lacquers, and for making certain disinfectants.

The rosin had been prepared by using crystalline alum for its clarification. It gave the following results on analysis:

Moisture	0.80 per cent.
Ash	0.15
Melting-point	74° C.
Acid number*	174
Saponification number*	184

* Milligrams of potassium hydroxyde required for 1 gram of rosin.

These results show that the rosin is of good quality. It was valued at £12 to £15 per ton in the United Kingdom.

P. P. PHILLIPS. **Gum from *Bombax malabaricum*.** (*J. Soc. Chem. Ind.*, 1911, 30, 469, 471). — Abs.: *The Analyst*, Vol. XXXVI, No. 424, p. 350. London, July, 1911. 2726

Bombax malabaricum (vern. *semul*), the red silk-cotton tree (order Malvaceae) yields a gum which exudes only from those portions of the bark which have been injured by decay or the attacks of insects (chiefly termites), but not from incisions in the healthy bark. The gum, known as *mocherus*, is sold in the form of brittle, mahogany-coloured tears, hollow in the centre. When powdered and treated with water, it swells up and yields a reddish-brown liquor, from which alcohol precipitates a little gum; the main bulk of the material is, however, insoluble in water. The gum leaves on incineration about 8 to 9 per cent of ash. An extract obtained by boiling the gum for four hours with water gave many of the characteristic reactions of tannin. It gives a green coloration with ferric chloride, changing to purple on the addition of very dilute ammonia. It precipitates gelatin, aud bromine water produces a copious yellow precipitate. The powdered gum dissolves almost completely in solutions of caustic alkalis. From its reactions, it is evident that the gum contains a considerable proportion of tannin, having the properties of a cathecol tannin. On dry distillation of the gum, catechol could be detected in the distillate. During distillation, a pinewood shaving, moistened with hydrochloric acid and placed near the mouth of the receiver, was instantly coloured violet. On hydrolysis of the gum with boiling dilute hydrochloric acid, a red coloured solution is obtained, with an insoluble residue having the colour of crimson lake. This colouring matter is only

Java

(1) The seed of this tree furnishes a silky cotton known under the name of *semul* and somewhat resembling the Kapok of *Eriodendron anfractuosum*. The gum is also used in medicine. G. WATTS, *Dictionary of the Ecouomic Products of India*. Vol I, pp. 487-492. Calcutta, 1889 (*Ed.*).

moderately soluble in alcohol; it does not possess the solubility generally attributed to the phlobaphenes. After removal of the tannins by lead acetate, the hydrolised extract reduces Fehling's solution.

2727 C. COFFIGNIER. **Characteristics of Different Varieties of Dammar Resin.** (*Bull. Soc. Chim.*, 1911, 9, 549-561). — *The Analyst*, Vol. XXXVI, No. 425, p. 422. London, August, 1911.

The chief results obtained in the examination of different kinds of commercial Dammar resin (1) are summarised in the following table:

	Sp. Gr. at 18° C.	Melting Point	Acid Value	Saponification Value	Insoluble in Alcohol	Insoluble in Ether	Insoluble in Benzine	Insoluble in Acetone	Insoluble in Carbon Tétrachlorid.	Insoluble in Amyl acetate
		°C			%	%	%	%	%	%
Straits Settlements. Dutch E. Indies: Sumatra										
Padang dammar (Sumatra) . . .	1.036	95° (soft at 55°)	31.4	33.7	20.30	4.50	soluble	14.70	soluble	6.20
Borneo dammar	1.048	120° (soft at 70°)	35.1	64.5	23.60	9.60	7.50	20.40	8.40	10.10
Singapore dammar	1.057	95° (soft at 55°)	30.1	39.3	10.10	1.00	soluble	14.00	2.50	4.10
Pontianac dammar	1.025	110° (soft at 65°)	19.9	30.9	22.40	4.10	soluble	16.40	soluble	4.00
Sumatra dammar .	1.004	190° (soft at 115°)	59.6	64.5	45.50	37.90	18.30	45.30	31.60	30.00
Batjan dammar .	1.032	105° (soft at 60°)	18.5	19.6	32.80	3.20	3.10	21.30	11.40	7.30

(1) Dammar (group of soft copals) is the name given to several resins of different origins: Coniferae, Burseraceae, Guttiferae and Dipterocarpeae (TSCHIRSCH, *Harze* 2 Aufl., I, pp. 483). Malay or pharmaceutical Dammar resin is produced by the *Shorea Wiesneri* of the Malay Archipelago. (WEHMER, *Pflanzenstoffe*, p. 592). Dammar resins are used as copal. *Dammara australis*, Lumb., produces New Zealand dammar or *Kauri*: the fossil deposits of this resin are very precious. The Kauri gum exported from New Zealand in 1908 was worth £ 372 798; and that exported in 1909, £ 552 698. *The Statesman's Year-Book, 1911*, p. 337).

For further information on dammar producing plants, see JACOB DE CORDEMOY. *Les Plantes à gomme et à Resine*. Paris, O. Doin, 1911. (*Ed.*).

Resins, Rubber and Essential Oils. (Allen's Commercial Organic Analysis, Vol. IV. Fourth Edition edited by W. A. Davis and S. S. Sadtler). — *Reviewed in Nature*, No. 2175, vol. 87, pp. 6-7, July 6, 1911. 2728

The articles in this volume which deal with resins, rubber and essential oils form a valuable summary of the general and analytic chemistry of these three groups.

Great Britain.

Thanks largely to the work of Tschirch and his coadjutors, it is now possible to make at least a provisional attempt at a satisfactory classification of the resins. The approximate constituents of these bodies, so far as they are known, may be divided into 1) *Resin-esters* and their decomposition products, 2) *Resinolic* or *Resin acids*; and 3) *Resenes*; the last being oxygenated compounds with no very characteristic chemical properties beyond the attribute — a very valuable one — of resistance to the action of alkalies. In many of the resins one or other of these three classes is the preponderating constituent, whence three groups can be distinguished, namely, *ester-resins*, *acid-resins* and *resene-resins*. The first group, for instance, includes (among others) gum benzoin, storax, « Dragon's blood », ammoniacum, and asafoetida; in the second group are the coniferous resins and copaiba balsam; and in the group of resene-resins are included myrrh, olibanum, dammar, and Manila copal. From a number of the ester-resins the alcohol of the ester has been isolated, and Tschirch distinguished two kinds of these alcohols. *resinols* and *resinotannols*. The former are colourless, and give no reaction for tannin when tested with iron salts; the latter are coloured and give a tannin-reaction. For the general analytical examination of resins, the acid, saponification, iodine methoxyl, and acetyl values are the determinations most frequently useful in forming a conclusion.

The chemistry of the essential oils is no doubt better and more widely known than that of the resins.

These oils to which the characteristic odours of flowers and plants are nearly always due, are composed of some halfdozen groups of compounds, one or two of the groups predominating in any particular oil. *Terpenes* constitute the bulk of many essential oils, but are seldom the most useful portion. In fact, various so-called « terpeneless » oils are now prepared, the removal of terpenes serving in effect to concentrate the odoriferous properties of the oil in the residual constituents. *Alcohols* of various types — open-chain, aromatic, and sesquiterpene alcohols — with their corre-

sponding *aldehydes* and *ketones*, are the important compounds in many oils. Examples are the alcohol *gerantol* in otto of rose; the aldehyde *citral* in lemon-grass oil; and the ketone *pulegone* in oil of penny-royal, bergamot, clove, and mustard oils which respectively owe their special properties to *esters*, *phenols*. and *sulphur compounds*.

2729 **Rubber Planting and Pulp Mill in Formosa, Japan.** — *The Board of Trade Journal.* Vol. LXXIV, No. 769, pp. 390-391 and 394. August 24, 1911.

Japanese Empire: Formosa

The following information is from the report by the British Consul at Tamsni (Mr. J. B. Rentiers) on the trade of Formosa in 1910.

Permission was granted during 1910 to a Japanese syndicate to form a rubber plantation, and some 3 500 acres of waste land in the Kagi prefecture were leased for this purpose. "Central American rubber" (*Castilloa elastica*), "Ceara rubber" (*Manihot Glazovii*), "Para rubber" (*Hevea brasiliensis*), "Assam rubber" (*Ficus elastica*) are to be planted together with banana, pineapple and lemon trees; while plantations of other trees will be made to protect the more valuable kinds of trees from wind and against fire. It is expected that the undertaking will be completed in 6 years.

The Government horticultural nurseries near Kagi are raising large numbers of the above-named trees in a plantation of 25 acres for distribution to the peasants, who will be encouraged to plant them and will be taught their proper management.

The Government have this year erected in the Kagi prefecture an experimental mill for the production of pulp from bamboo. with an area of supply of 168 acres of growing bamboos. The mill was to be completed before the middle of 1911. The market for the pulp will be Japan

2730 **Extent of Rubber Culture in Java.** — *The Tropical Agriculturist.* Vol. XXXVI, No. 6, p. 485. Colombo, June 1911.

Dutch E. Indies

In the *Nitgestrektheid der rubbercultuur op Java, Cultuurgids*, I., 1910, p. 864, the following figures are given for the different districts :

Residency	N. of Estates	Extent in bouws	Extent in acres
Bantam	11	3 067	5 378
Batavia	13	3 709	6 503
Preanger R.	13	6 386	11 197
Cheribon	4	1 550	2 718
Tegal	1	100	175
Semarang	16	3 406	5 972
Soerabaia	3	692	1 214
Pasoeroroean	41	11 700	20 515
Besoeki	25	8 753	15 348
Banjoemas	8	3 162	5 544
Kediri	12	2 925	5 129
Soerakarta	10	3 580	6 277
Total	157	49 030	85 968

Of this total it is estimated that 6431 bouws (11 276 acres) are *Ficus*, 25 550 bouws (44 799 acres) *Hevea*, the remainder being *Manihot, Castilloa*, etc. (1).

The Cultivation of Rubber Plants in Celebes (Kautschukanbau auf Celebes). — *Gummi - Zeitung*, 25 Jahrg. No. 46, p. 1769. Berlin, 18 August 1911. 2731

The Chamber of Commerce of Macassar advises that the rubber plants are thriving well at Beni, where even the natives are strongly intersted in their growing. At the beginning of 1910, there were permanently planted in the experimental field of Bunpama, 40 000 plants of *Ficus elestica*, from seeds originating from Buitenzorg. 30.000 have been planted by private initiative. In both cases the plantations thrive in a way that leaves nothing to be desired. Dutch E. Indies: Celebes

Rubber Culture in Tobago (2). — *Agricultural News*, Vol. X, No. 241 p. 233. Barbados, July 22, 1911. 2732

A pamphlet with this title has been issued by the Permanent Exhibition Committee of Tobago for the International Rubber Exhibition. Turiidad: Tobago

(1) See Abstract 1797 *Bull.* May, 1911. (*Ed.*).
(2) See Abstr. 878 *Bull.* March, 1911. (*Ed.*).

After giving a brief account of the history of rubber-planting in Tobago, and of its present extent, the pamphlet proceeds to deal with the following subjects: rate of growth of trees (*Castilloa elastica*); method of tapping; yield of latex; methods of rubber-curing; Hevea in Tobago; and concludes with a short account of the main agricultural conditions of the island.

2733 **Rubber Production in Bolivia.** — *The Board of Trade Journal*, No. 765, pp. 186-187. London, July 27, 1911.

Bolivia

The production of rubber in Bolivia in 1910 amounted to 3117 metric tons (1), of which 2641 were obtained in the *Territorio Nacional de Colonias* and the department of the Beni, and the rest in the la Paz and Santa Cruz departments. The greater part of the rubber, 2469 metric tons, was exported, by way of the Amazon river. As regards the destination of the exports 1297 metric tons are given as going to the United Kingdom, 575 to Germany and 825 to Brazil.

It is estimated that 75 per cent of the rubber exported from Bolivia is of fine, and the rest of ordinary quality (*scruambey* and caoutchouc).

2734 **Rubber Plants in Paraguay.** (Sobre plantas cauchutiferas en el Paraguay). — *Revista de Agronomia y Boletin de la Estacion agronomica de Puerto Bertoni*, Tomo IV, N. 8, P. 41, Asunción, Agosto y Setiembre 1910.

Paraguay

The only native speecies yielding rubber known in commerce is the "Mangaveira" (*Hanconria speciosa*), growing to the North of Jejui, above all near Tacuati and d'Horqueta. This species also grows spontaneously in various parts of Brazil, where it is worked; the rubber it yields is known on the European market under the name of Pernambuco rubber.

There has been found in Paraguay the *Manihot Glaziovii*, but not the rubber variety, as was proved in the efforts made to cultivate it at Trinidad, West Indies.

There are a few latex-producing "Ihshipo", above all those allied to the genera *Forsteronia* and *Marsdenia*, but efforts made to

(1) 1 metric ton = 1000 kilos. = 2204. 6 lbs.

work these have up to now yielded no satisfactory financial results, owing to the high cost of labour.

The species locally termed " Muerdagos " (1) or " Kaavotihreih " contains rubber in their fruits, but there is the same difficulty in the way of its utilisation.

The most preferable method of coagulation according to the author is by the use of alcohol.

Rubber Plants in British East Africa, new Species of *Landolphia*. Cultivation of the *Manihot Glaziovii*. — *Gummi Zeitung*, 25 Jah. N. 46, p. 1769. Berlin, 18 August 1911. 2735

The exports of raw rubber from British East Africa in 1907-08 attained a value of 29 049 Rupees, and in 1909-10 a value of 225791 Rupees. The exports have increased ten-fold owing to the discovery of a wild species of *Landolphia*, which grows in the forest reserves of Nandi. British East Africa

Unfortunately the natives make such numerous incisions on this climber that they will finally exhaust it completely; this has happened in certain districts where the plant has already disappeared.

The experience of the past year has shown that vast expanses on the coast zone, the middle zone (district of Kibweri) and the zone bordering on Lake Victoria, are adapted for growing *Manihot Glaziovii*. Up to now 2000 acres have been planted with *Manihot*, and the prospects are that this culture will undergo further considerable expansion.

The rubber produced by the plantation has hitherto been exported in small quantities only, but these plantations will soon arrive at the age of production, and in the course of next season this exportation will begin to assume proportions of commercial importance.

The Demand for Hevea Seed in Singapore in 1910. — *La Quinzaine Coloniale*, XV^e^ Année, N. 15, pp. 538-539. Paris, 19 Août 1911. 2736

The demand for Hevea seed was considerable in 1910 owing to the large number of new plantations. The Botanical Gardens of Singapore, Straits Settlements, were the principal source of supply. Straits Settlements

(1) « Muerdago de Mejico ». *Loranthus mexicanus resl.* (MIGUEL, COLMEIRO, *Diccionario de los nombres vulgares de muchas plantas usuales, ó notables del antiguo y nuevo mundo*, p. 129. Madrid, 1871). (*Ed.*).

For some reason still difficult to discover, seeds of other origin used did not show equally pronounced germinating properties. The price is up to 50 francs (£2) per thousand.

The total of nnmber of seeds consigned in 1910 was 1 326 300, of which 321 300 were supplied by the Botanical Gardens and 1005 000 by other sources. Uganda was the largest importer with 513 600. Next come: Liberia with 273 000, Southern Nigeria with 150 600, then Kelantan with 129,000, etc.

2737 **Record Rubber Yield of a Hevea in Ceylon.** (Reeord-Kautschukertrag). — *Gummi-Zeitung.* 25 Jahrg. N. 46, p. 1769. Berlin, 18 August 1911.

Ceylon

The tree springs from the seeds brought to Ceylon by Mr Wickham (1). It measures 142 cm. (57 inches) in girth, and daily tappings (except Sundays and very wet days) yielded in 1909 and 1910, 160 lbs. (72.48 kg.) of dry rubber (2).

2738 **Tapping Experiments with Ceara Rubber in Uganda**, — *The Agricultural News.* Vol. X. No. 243, p. 265. Bridgetown (Barbados) August 19, 1911.

Uganda

The results of two months' (February and March) tapping of twelve Ceara (*Manihot Glazovii*) trees belonging to the Mabira forest in Uganda show that, whereas the trees tapped on the pricking system gave a decrease of 59.51 per cent in the second month, those which were tapped on the paring system, with no pricking, yielded an increase of 24.23 per cent. The total amount of dry rubber obtained from six trees by paring was 299.15 gr. which is equivalent to 24.93 gr. per tree per month, or assuming a constant

(1) *i. e.* from the famous 1919 plants raised in Kew from the seeds brought from Brazil by Mr H. Wickham. See H. Stevans and C. Beadle, *Rubber*, London.

For the history of the introduction of *Hevea Brasiliensis* into Asia, see G. Watt, *Dictionary of the Economic Products of India*, Calcutta, 1890, vol. IV, p. 367. (*Ed*).

(2) According to W. Wicherley, *The whole Art of Rubber-growing*, London 1911, there was in Ceylon a plant of the same origin having a girth of 114 inches which in 1910 yielded 96 ½ lb. of dry rubber.

yield of this nature, an average of 299.15 gr. or 0.66 lb. per annum ; Further work will determine if the yield is maintained during the year, and it may be mentioned in this connexion, that February was a very dry month and that the rainfall for March was below the average. The most important point will probably be the effect on the trees of continuous tapping (1).

Effect of Nitrate of Soda on the Flow of Ceara Latex. — *The Agricultural News*, Vol. X, No. 243, p. 265. Bridgetown (Barbados), August 19th, 1911. 2739

Experiments have been carried out, on estates in Southern India, to investigate the effects of nitrate of soda on the flow of Ceara latex. In one of these, the results were not very conclusive, but it was indicated that the application of nitrate of soda caused an increase in the flow of latex and yield of rubber. **British India**

In another case, more elaborate trials appeared to show that, under the conditions of the experiments, the best quantity of nitrate of soda to apply is ½ lb. per tree ; this increased the yield of wet rubber from 1 oz. 10 ²/₃ drs. to 2 oz. 5 ²/₃ drs. per tree, in eight tappings, and the yield of dry rubber was increased by 5 drs. per tree in the same time.

Further work is required before any decision can be made as to the proper means of manurial treatment with nitrate of soda for Ceara rubber trees.

C. Christy. **The African Rubber Industry and *Funtumia elastica (Kickxia)*,** pp. XVI + 252. London: Bale, Sons and Danielsson, 1911. — Abstr. in *Nature*, No. 2179, vol. 87, pp. 146-147. London, August 3, 1911. 2740

Dr. Christy first gives a general account of the African rubber industry, and shows the fluctuation in exports of raw rubber from the Gold Coast, Sierra Leone, Southern Nigeria, Liberia, the French Ivory Coast, Togoland, Kamerun, the Belgian Congo, and East Africa. There is, however, nothing which would lead one to expect that Africa will henceforth increase its crop of raw rubber, despite the **Uganda**

(1) See Abstr. 884 *Bull.* March. 1011. 1209 *Bull.* April. 1911, and 1450, *Bull.* 1911, (*Ed.*).

large number of vines and trees which have been planted during the last few years.

A considerable amount of information is given on the botany, life-history, and structure of *Funtumia elastica*, Stapf, known in the early days as *Kickxia elastica*, Preuss. It appears that in Uganda this tree loses most of its leaves during the dry, hot period of January to March. It is, however, never quite leafless. Young shoots are produced, and old leaves fall more or less freely at all seasons of the year. The trees flower from November to December, and the fruits are mature six months later. The author is of opinion that the wind-blown seeds carried beyond the limits of the forest never produce permanent plants, owing to the long grass covering the country outside the forest areas (1). In the scrub formation (Acanthus) the seeds appear to have a better chance. The permanent Funtumia trees are found largely in belts where the forest is hilly; though these belts are usually well-defined, their distribution appears to be influenced by water-level conditions.

In Uganda the trees appear to grow in large groups varying from family parties to large belts and areas several square miles in extent: in some cases the growth is entirely made up of this species, but in other cases the species is scattered.

After discussing the distribution, climate and soils for Funtumia, the author goes into detail regarding other species of Funtumia — *Funtumia latifolia*, and *Funtumia africana* — the latex from which, however, possesses very little rubber, though it may be used, even intentionally, by natives for adulteration. The chemical and physical characters of the latex and the methods of coagulation have been studied by Dr. Christy in Uganda. Funtumia has supplied large quantities of Lagos-silk rubber in the past, and will continue to do so for many years to come. Nevertheless, it is a species which does not lend itself to cultivation: wherever it has been tried — in Ceylon, Malay, Samoa, New Guinea, etc. — its growth has been so slow and the yields so small that planters have abandoned all hopes of ever cultivating the tree profitably.

2741 SCOBELL, GRAHAM AND HOLMS. **The Guayule Industry in Mexico.** — See above, Abstr. 3405.

(1) Interesting observation on the influence of grasses on the growth of trees. See the experiments of the Duke of Bedford and of U. S. Pickering at Woburn. See also Abstr. 479. February, 1911. (*Ed.*).

Jelutong Rubber in Federated Malay States and Straits Settlements. — *The Tropical Agriculturist*, No. 6, p. 482. Colombo, June 1911. 2742

The United Malaysian Rubber Co. has secured an agreement with the Government of the Federated Malay States, granting it the sole right of tapping jelutong trees and collecting getah jelutong or latex of such trees over an area of nearly 5 000 000 acres. (1) Straits Settlements. Federated Malay States

Over this area the licensed servants of the concessionaries, each bearing a zinc label, will be permitted to tap jelutong trees for a period of ten years. At the conclusion of this period, the agreement will be extended to another seven years, unless either of the parties give notice, six months in advance, of a desire to terminate the contract. The company must commence tapping within four months.

The United Malaysian Rubber Co. is building a large jelutong establishment on Kerimum Island in the Straits of Malacca, and at a point very convenient for handling the product of this immense concession.

The mill will be equipped largely with American machinery.

Perrier de la Bathe. **Observations on the Pirahazo (*Euphorbia pirahazo* Jumelle).** — *Colonie de Madagascar et Dépendances, Bulletin économique*, 10e année, N. 2, pp. 247-250. Tananarive, 2e Semestre 1910. 2743

The Pirahazo was in former times relatively common in Madagascar in the forests of the central plateau. The great quantity of rubber it produced however led to its destruction by the natives, even in the remotest districts, and the Pirahazos of Ankisompobe, reserved by the Colonisation department, are at the present time the only and last adult representatives of this species, which is approaching extinction. Madagascar

To harvest the rubber the natives fell the tree level with the ground, raise the trunk on some kind of support, cut it round circularly at intervals of 20 centimetres (8 inches) and collect the latex in vessels placed beneath each incision. Frequently the roots are also torn up and treated in the same way. In this way the

(1) Cf. Abstract 2191, *Bull.* July 1911. (*Ed.*).

yield is enormous and ranges from 1 to 5 kilogrammes (2.2 to 11 lbs) of rubber per tree.

The author has sought for a method of working which would allow of obtaining a maximum annual yield without doing any harm to the vegetation of the tree. These experiments yielded the following results :

1. Tapping by transverse incisions 4 cm. (1.6 inches) in length and 10 cm. (4 in.) apart: 342 grammes (12 oz.) of dry rubber were extracted from a 12 metre (40 ft.) tree. Two tappings may be made per annum on this method. As this process however yields a product of non-marketable appearance and causes losses of latex, it must be rejected.

2. Tapping by longitudinal incisions 1 metre (39 inches) long, 6 in number and 20 cm. (8 in.) apart : 270 grammes (9 $^1_2$ oz.) of dry rubber were extracted from a tree 1.20 metres in girth. Two tappings per year can be made.

By adopting the same method as for the Ceara, *i. e.* merely piercing the trunk at a height of 1 metre, the author obtained, from an average tree, 110 grammes (4 oz.) at a single tapping. (When tapped for the first time under these circumstances, a Ceara only yields from 10 to 20 grammes ($^1_3$ to $^2_3$ oz.) of rubber). Four tappings of this kind may be made successively in one year. On the other hand this method presents serious drawbacks; the bark rapidly becomes rough and wrinkled, which renders the subsequent crops difficult, and the rubber can only be obtained in the form of scrap.

The author has not yet tried V-shaped incisions, but it is probable that these methods will yield better results, and should consequently be adopted to the exclusion of all others.

The wounds close very rapidly on the trunks. The best time for tapping appears to be the dry season. The assay of dry rubber in the latex varies from 300 to 350 grammes per litre (30 to 35 %).

The best method of coagulation is to evaporate the latex on a porous surface. The rubber, thus obtained in thin slabs, must subsequently be subjected to strong pressure, which gives it great tenacity and elasticity.

The young Pirahazo do not produce rubber before the 15th year. This species, being deciduous, can only be cultivated where there is a clearly marked dry season.

The forest species, the presence of which indicates a soil favourable to the Pirahazo, are the " Ramy " (*Canarum multifloreum*, Eng.), the " Tsiseroka " (*Musa Perrieri*, Claverie), the " Amiana " (*Urera* sp.) and the arborescent Euphorbias with well developed leaves.

Acidity of Rubbers. — *La Quinzaine Coloniale*, XV^e Année, No. 15, p. 539, 10 Août 1911. 2744

It has become a habit to make a very clear distinction between rubbers obtained by coagulation of the latex by means of acids, and those obtained by smoking ; many manufacturers prefer smoked rubbers such as the hard and soft Para, because these rubbers can be worked better and present more elasticity, while plantation rubbers, usually coagulated by acids, such as the sheets, cakes and biscuits, are less suitable for certain uses. **Brazil : Pará**

Nevertheless the species of wood usually employed for smoking yield pyroligneous acids which are liberated in the smoke. These acids are themselves the source of the acetic acid used on plantations for coagulating the latex. Therefore this acid should be present both in smoked rubber and in rubber treated by acid.

This is indicated by the tests of Mr. Clayton Beadle and Dr. Henry P. Stevens, (*The India Rubber Journal* vol. XLI, No. 22, p. 15) who analysed rubbers of different origin. They even show that the degree of acidity is not notably different. In these tests the acid was separated from the crude rubber by extraction with cold water for several days, or by boiling rapidly in water. The two methods yielded the same results. The percentages of acetic acid (average of several tests) found in the raw rubbers were :

Hard fine Para, 0.156 ;
Soft fine Para, 0.132 ;
Plantation, dark sheet 0.228 ;
Plantation, pale sheet, 0.292 ;
Plantation, pale cake 0.120 (other samples from 0.017 to 0.020).

As may be seen from these tests, the Brazil rubbers are far from being free from acid ; they are generally a little freer than unwashed plantation rubbers, such as pale and unsmoked sheets.

Washed cakes contain least. It must be pointed out, however, that the re-action of the freshly gathered latex is alkaline ; but this alkalinity, which is often already neutralised by the acid juices which flow from the bark together with the latex, disappears with smoking.

Laboratory for the Smoking of Rubber. — See below, Abstr. 2951. 2745

2746 **Exports of Rubber from the Amazon Basin in 1910-11.** — *The Board of Trade Journal.* Vol. LXXIV, No. 769, p. 389. London, August 24, 1911.

The British Consul at Parà (Mr. G. A. Pogson) has forwarded the following statistics of the exports of rubber from the Amazon basin during the crop year (ended 30th June) 1910-11:

	Kilogs.
To the United States from	
Pará	6 911 813
Manaos	6 361 572
Iquitos	224 608
Itacoatiara	29 539
To Europe from	
Pará	8 064 478
Manaos	9 726 705
Iquitos	2 146 964
Itacoatiara	76 027
Total	33 532 706

1 kilog. = 2.2046 lbs.

The total exports of rubber from the Amazon Basin in 1909-10 amounted to 38 953 475 kilogs., and in 1908-9 to 38 234 871 kil.

2747 **Candelilla Wax** (1). — *The Agricultural News.* Vol. X, No. 239, p. 203. Barbados, June 24, 1911.

Material for planting the species of *Pedilanthus* from which candelilla wax is obtained has been distributed among some of the Botanic Stations by the Imperial Department of Agriculture of the West Indies.

Barbados: West Indies. Mexico

At San Luis Potosi, Mexico, a local firm has fitted up a factory and is extracting the wax. The shrub is being delivered to the local firm from neighbouring haciendas and waste mountain lands. The plant is pulled up, as the easiest method of gathering it, but as the subsoil is a mass of tangled roots it is said that its destruction is almost impossible. The local dealer has thus far recovered about

(1) Cf. *Bulletin*, p. 117, Nov. 1910. (*Ed.*).

3 per cent. in weight of wax. The entire shrub is put into boiling-tanks and the wax skimmed from the surface. The waste is used as fuel to heat the tanks.

The shrub grows in great profusion on the mountain sides and waste lands in San Louis Potosi State. It is locally said that the wax seals the plant against evaporation. and enables it to flourish on thin soil and with a minimum of moisture.

The yield is estimated at 12 to 18 tons per acre (30 000 to 45 000 kgs. per hectare), and the plant grows again rapidly.

The following data are condensed from a pamphlet issued by the U. S. Department of Public Instruction:

The candelilla contains a small amount of rubber: less than one-half per cent. Near the coast it increases in size but yields less wax. The wax is harder and more brittle than beeswax and possesses a high coefficient of expansion. Its melting point is from 67°C. to 80° C., specific gravity 0.982 to 0.9856, saponification value 85 to 86.5, hydrocarbons 42.5 to 59.7; it dissolves in turpentine, chloroform, hot ether, and benzine.

M. G. Boyer. **Truffles and Re-afforestation.** (1). — *Revue Scientifique*, 49e année, No. 3, pp. 79-81. Paris, Juillet, 1911. 2748

Truffles are not the only fungi which seem to live as semi-parasites on the roots of trees. Many others, above all the Hypogea and a large number of basidiomycetes and ascomycetes, in short, all the fungi with mycorhiza mycelium, appear to share this method of nutrition. France

The writer frequently met with a scleroderma, *Scleroderma verrucosum* (Pers.) var. *spadiceum* (Schaff.) in truffle grounds, the mycelium of which, clearly adhering to the tuber, and in addition perfectly conspicuous and abundant, was followed down to the mycorhizas of the oak, with which it was joined, and of which it seemed to form a continuation. This fungus abounds in the Périgord truffle grounds, and seems to have the same mode of nutrition as the truffle.

For this reason, and owing to its rapid multiplication, it may be inferred that it is a redoubtable competitor to the truffle. This indeed results from all the observations the writer was able to make.

It is of the utmost importance not to favour competitors of the truffle, if remunerative products are to be obtained.

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(1) Cf. Abs. 1453 *Bull.* May 1911 (*Ed.*).

Observation on Boulanger's Truffle-Growing Experiments. These considerations suggest a reflection with regard to the method of procedure adopted by M. Boulanger for propagating the truffle in his woods. According to M. Guégen, this truffle-grower had no hesitation in spreading as much as ten thousand kilogrammes of carrots per hectare (4 tons per acre) beneath the oaks on his estate. Together with these carrots there were fragments of truffle, the development of which they were no doubt intended to serve, nourishing and at the same time spreading the germs.

Is there not reason to fear that these carrots, which are an excellent manure, and sufficiently rich in nitrogen, may favour and cause the propagation of an infinite number of moulds and all kinds of fungi and other plants injurious to the truffle ?

The view which the writer takes of the conditions of life of the truffle explains a large number of observed facts ; for instance, the injurious action of over-dense plantations. It also brings home the necessity of working truffle grounds for the purpose of freeing them from weeds. Ploughing, in addition, serves to mellow the ground, and thus make it more permeable to the mycelium, and more accessible to the penetration of air, of which the truffle seems to have great need, because, according to the writer, it has an intense respiration. It further has the favourable result of preventing over-rapid drying, which arrests the formation and development of the tubers.

Nevertheless, whatever the steps taken, a time will come for the truffle output to cease. This will at latest be the time when the trees have attained great development. Then however, re-afforestation will have been effected, and in short, owing to truffle growing, land which otherwise would have remained bare and unproductive, and possibly even deeply ravined and made permanently sterile, will be peopled with robust plants. True forests will have been created under the best conditions, because they will have cost nothing, the cultivations in the open spaces and truffle production having fully repaid all expenses incurred. Fertility and wealth will, in regions of broken and irregular ground, have taken the place of sterility and ruin ; even the plain will no longer need to apprehend the washing away of its soil and the disastrous consequences of floods. In short, all the benefits of re-afforestation will have been secured owing to truffle growing.

" The creation of artificial truffle grounds, which may begin to yield within ten years, and continue remuneratively for 15 to 20 years or more, without any other care than annual working of the soil, may offer a great encouragement for methodical endeavours to restore forests ".

The Trade in Edible Wild Mushrooms in France. — *Le Cultivateur du Sud-Centre*, 24e An., No. 128, pp. 499-500. Rodez, 16 Août 1911. 2749

The consumption of mushrooms in France is enormous, even if cultivated mushrooms and truffle be excluded. Very few preserves are prepared from wild mushrooms, the value being barely 250,000 francs per annum, represented by 2 species only: the Polish mushroom and the golden agaric. France

The species most usually eaten are the following: *Amanita caesarea, Tricoloma nudum, Tricoloma Georgis, Lepiota procera, Lactarius deliciosus, Marasmius oreades, Psalliota arvensis* and *P. campestris, Cantharellus cibarisus, Craterellus cornucopioides, Boletus edulis, Boletus aurantiacus, Morchella rotunda, M. conica, M. semilibera*, etc., *Verpa digitaliformis, Peziza acetabulum, P. venosa*, etc., *Hydnum repandum, H. imbricatum*, various *Clavaria, Polyporus frondosus, P. brumalis*, etc. (1).

These are the only wild mushrooms the sale of which is at present allowed. The frequent poisonings recorded every year might be very much reduced by the establishment of a well organised inspection service of the shops where they are sold.

Live stock Breeding. — Aviculture Silk Production. — Beekeeping. — Game and Fisheries. — Animal Industries. 2750

V. Robin. **The Serotherapy of Scour in New-Born Calves.** — *Revue Vétérinaire*, N. 7. Toulouse, 1er Juillet 1911.

The knowledge of the etiology of scour in new-born calves gained of late years, has shown that the search for a preventive or curative serum involved difficulties not easily overcome. Until a fuller acquaintance has been obtained with the nature and number of the germs which, under influences which in themselves are far from well known, become virulent and give rise to the appearance of an enzootic disease, and until, on the other hand, we are in possession of a serum of sufficient polyvalency to be used reliably in any form whatever of scouring in calves, serotherapy will only be an illusory prophylactic method. Pending further progress France

(1) Almost all these species are also given as edible in Italy Cf. F. Cavara, *Funghi mangerecci e funghi velenosi*, M. Hoepli, 1897. (*Ed.*).

therefore, importance must be attached to measures of a sanitary character, particularly the attention to the umbilical region, as advocated by Nocard and simplified by Moussu, as forming the basis of a rational system of combating scour in new-born calves. Moreover, the very satisfactory results obtained by the many surgeons who have put this system into practice, enable us to await with patience the very hypothetical discovery of an effective and practical serotherapeutic method.

2751 M. G. Moussu. **On Paratuberculous Enteritis in Cattle.** (Séances des 10 et 17 Juin 1911 de la Société de biologie). — *Revue Vétérinaire*, No. 9. Toulouse, 1er Septembre 1911.

This disease, already reported in Germany, Denmark, Holland and Belgium, is raging in the North-West of France, on the Channel coasts. It is chiefly a disease attacking animals grazing in the open.
France It is manifested by copious and frequent scouring, and progressive emaciation, which cannot be stopped in any way. Its evolution is much more rapid than that of tuberculosis. Sometimes in a few weeks, but mostly in some months, the fatal issue arrives.

The microscopic lesions are insignificant, but bacteriological examination shows the presence of a very large number of bacilli, having the histo-chemical reactions of the tubercle bacilli, in the mucous membranes of the ileum and the large intestine, and also in the mesenteric ganglia. M. Moussu regards this bacillus as not being a true tubercle bacillus of human or bovine type, attenuated or otherwise, nor a bacillus of avian character. It most certainly belongs, however, to the same group as tubercle bacilli. It differs from them in not being cultivable on the ordinary media used for tubercle bacilli. Subcutaneous injection of ganglion pulp never gives rise to tuberculosis; by mixing infected products with the food of hens, avian tuberculosis is not produced; finally, animals attacked by paratuberculous enteritis do not react to the different tuberculin tests.

Furthermore, if healthy and diseased animals be kept together for a length of time in the same shed the disease is not transmitted. But when an animal suffering from paratuberculous enteritis has been introduced into grazing stock free from the disease, the number of cases of specific diarrhoetic enteritis increases from year to year. It is, therefore, an infectious disease attacking animals grazing in the open, and which is propagated under conditions still unknown.

Outbreaks of Foot-and-Mouth Disease in England. — *Nature*, Vol. 87, p. 333, London, Sept. 7, 1911. 2752

The Board of Agriculture and Fisheries has decided to appoint a departmental committee to inquire into the circumstances of the recent outbreaks of foot-and-mouth disease, and to consider whether any further measures can be adopted to prevent their recurrence. The committee will be appointed, and sit in the autumn under the chairmanship of Sir Ailwyn Fellowes. Great Britain: England

***Dermaceutor venustus*, Cattle Tick, in West Montana, United States of America.** - See above, Abstr. 2425. 2753

G. H. Schultz. **Destruction of Live-Stock Parasites by Fish and Ducks.** (Rainfall and Parasites). *Scientific American*. Vol. CV. No. 11, p. 227. New York, September 9, 1911. 2754

Some years ago Dr. Hutchinson, meat inspector at Portland, Oregon, by careful observation found out that cattle and sheep from overflow districts where carp were numerous, were free from liver flukes (*Distoma hepatica* or *Fasciola hepatica*). The carp is a good scavenger, and destroyed the flukes during their water stage, or destroyed the water snails that were the hosts, during a certain period, of the *Cercariae*. United States: Oregon

In the nineties the writer was in practice on the coast of Oregon, in Coos County. There great losses occurred from *Distoma hepatica*, especially after wet seasons, when the bottom lands had been under water and were used as pasture soon afterward. Lungworms also killed many sheep and calves.

After many attempts to cure the affected animals the question of the prevention of the evil was considered.

It was observed that in two ranches, where ducks were systematically run, the calves remained healthy, and the sheep were free from lungworms. This latter fact was noteworthy, because the life-cycle of this parasite has not yet been worked out.

The keeping of water fowl, especially ducks, is indicated in game reserves. Ravages of *Distoma hepatica* among elk, moose, deer, are common, and the ponds are infested before the cause is known and the losses appear. But if some quarters are provided for ducks and swans and geese (they may be ornamental, although Indian Runners are the best) and their breeding favoured, they will destroy many injurious forms of life which are necessary for the complete life-cycle of several parasites (water snails — Cercariae stage).

Observations made during several years led to the assumption that the same means also prevent the development of *Strongylus filaria* and similar parasites (*Ovis pulmonalis*) in sheep and cattle and hogs.

2755 Dr. Henry C. Sherman. **The Effects of Diet upon the Resistance of Animals to Certain Poisons**. — 1 vol., pp. VIII + 355. New York, 1911.

United States

The purpose of Dr. Sherman's volume is to present the principles of the chemistry of food and nutrition with special reference to the food requirements of man and the considerations which should underlie our judgment of the nutritive values of food.

The plan followed is 1) to describe briefly the principal foodstuffs, and the agencies and processes through which they become available for the uses of the body; 2) to follow their functions in the tissues and their fate in metabolism; 3) to determine the food requirements of the body under different conditions; 4) to ascertain the functions of the individual chemical elements in nutrition, and the quantities in which they should be supplied by the food; 5) to consider the criteria by which we should judge the nutritive value and economy of articles of food. Experiments upon growth and development may not always exhaust the question of nutritive value in the broadest sense, as is shown by the following striking extract which is incorporated in Dr. Sherman's interesting volume.

« Hunt has recently found great differences in the resistance of animals to certain poisons, which appear to be attributable to diet alone.

... « In extreme cases mice after having been fed upon certain diets may recover from forty times the dose of *acetonitrile* fatal to mice kept upon other diets. It is, moreover, possible to alter the resistance of these animals at will, and to overcome the effects of one diet by combining it with another ».

« The experiments with oats and oatmeal and eggs are of especial interest. In the earlier parts of this paper many experiments were quoted showing that a diet of oatmeal or of oats usually leads to a marked resistance of mice to acetonitrile; the experiments quoted in this section, which show that the administration of certain iodine compounds with, or subsequent to, such a diet further increases this resistance, and the experiments previously reported showing that as far as the resistance to acetonitrile is concerned, iodine exerts its action through the thyroid gland, all point to the conclusion that, the resistance caused by an oat diet is in part an effect exerted

upon the thyroid. This effect is obtained much more markedly and constantly with young, growing mice. From these experiments and considerations it seems very probable that it is possible to influence, in a specific manner, by diet, one of the most important *hormones* in the body ; this is a comparatively new principle in dietetics and one which may prove of much importance » (1).

A. Morgen, C. Beger and F. Westhausser. **Comparative Feeding Value of Green Grass and Hay.** (Ueber den Futterwert des frischen Grases und des daraus gewonnenen Trockenfutters). — *Die landw. Versuchs. Stationen*, Bd. LXXV., H. V u. VI, pp. 321-348. Berlin, 1911. 2756

Experiments were carried out in 1910 at the Royal Württemberg Agricultural Experiment Station at Hohenheim on the comparative feeding value of fresh grass and hay, the latter made in the ordinary way and also dried in hot-air chambers. Germany Württemberg

The effect of these fodders on milk-yield was tested on three ewes and a goat ; the digestibility on the same three ewes later in the summer.

The milk-yield showed no constant difference in quantity or in composition from the green and dried grass ; but the digestility of fresh grass was constantly, though slightly, greater.

The writers point out that the process of drying has a distinct influence on the nutritive value. In ordinary haymaking there is considerable loss from oxidation. This may be avoided by a rapid drying in which the initial temperature is high, but does not exceed 100° C.

The changes in digestibility seem rather to be due to changes of a physical nature than to chemical decomposition. The changes are sometimes so small as hardly to alter the proportion of starch.

The writers intend to investigate the influence of the various methods of drying (2).

(1) Hunt. The effects of a Restricted Diet and Various Diets upon the Resistance of Animals to Certain Poisons. *Bull.* 69, Hygienic Laboratory U. S. Treasury Department, 1910.

(2) Hitherto no definite results have been obtained from artificial drying. Where the weather allows of natural desiccation, apparatus for artificial drying can not be advantageously employed. Besides which the aromatic substances do not stand artificial desiccation.

See O. Kellner, *Die Ernährung der Landw. Nuizthiere.* p. 229, Berlin, 1909. (*Ed.*).

2757 R. Woy. **Customs Examination of Rye and Wheat Bran.** (*Zeitsch. öffentl. Chem.* 1911, 17, 101. 109; through *Chem. Zentralbl.*, 1911, I, 1447) Abstr. in *The Analyst*, Vol. XXXVI, No. 424; p. 350. London. July, 1911.

Germany

The classification of bran according to its ash content was irrational, and the more recent official German method, in which account is taken of the proportion which passes a fine sieve, is not much better. A starch estimate is the only rational basis of classification, and should be prescribed now that quick and sufficiently accurate methods are available. The writer prefers the method of Ewers (*Zeitsch. öffentl. Chem.* 1909, 15, 8) to that of Lintner (cf. Thorne and Jeffers, *Analyst*, 1909, 34, 332); because it avoids the use of concentrated acid. Using Ewers' method with 5 grm. of substance, and polarising in a 200 mm. tube at 20°.C, the author finds the correct factor (assuming the use of the Soleil-Ventzke scale) to be 1.892. It is suggested that some substance other than coal-dust might be prescribed for denaturing bran—some substance that would not detract so much from its commercial value, whilst attaining the object of the Customs authorities.

2758 **Feeding Value of Pumpkins.** — *Dry-Farming, Off. Bull. of the Int. Dry Farming Congress.* Vol. IV, No. 10, p. 959. Colorado Springs, Colo., August 1, 1911.

United States: Oregon

Pumpkins make an excellent feed for swine when fed in conjunction with maize during the early stages of fattening. In this it would be advisable to feed about one-half a full feed of maize and allow all the pumpkins the stock would consume. During the latter stages of the fattening period, pumpkins are too bulky for best results, although a few of them may be fed.

The Oregon Station found that a 200 pound pig consuming 26 lbs. of cooked pumpkin and a small amount of shorts gained 1 1/5 lb. per day. This is good gain. Other investigators have found that 273 lbs. of grain and 376 lbs. of raw pumpkin produced 100 lbs. of pork. This also is a very satisfactory return.

Experiments show that cooking pumpkins does not add to their value, but rather decreases it. (1).

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(1) In Italy pumpkins are grown as food for pigs; these animals eat them greedily; cf. A. Menozzi and V. Micoli *Alimentazione del Bestiame*, 2 Ed., p. 388. Milano 1910. (*Ed.*).

Fish Meal and its Uses in Cattle Feeding. (Rapp. du Cons. des E. U. a Hambourg). — *L'Engrais*. 26e An., No. 25. Lille, 23 Juin 1911. 2759

Different varieties of fish supply the various kinds of fish meal used for cattle feeding. In Norway the cod and the herring are chiefly used; in England and Scotland, the waste from all sorts of fish is used for this preparation. Norway Great Britain

The cods are dried in the air, and then in an oven and finally the dry product obtained is ground. This meal is sold on the basis of a content of 50 % to 60 % of protein (albumen), 1 to 2 % of fat, and 24 % to 28 % of phosphate of lime.

The herrings are first cooked, then pressed, dried and ground. With fresh herrings the meal obtained contains 60 to 70 % of protein, 10 to 12 % of fat, and 8 to 10 % of phosphate of lime, while the meal of salt herrings and herring waste contains 50 % of protein, 7 to 8 % of fat, and 8 to 10 % of phosphate of lime.

English fish meal is obtained by the action of steam on fish waste, which is afterwards dried and ground. Generally it contains 55 to 65 % of protein, 3 to 6 % of fat and 14 to 18 % of phosphate of lime.

Pigs are fond of this food; it can likewise be supplied to cows and calves. It is also used with advantage in carp ponds, care being taken to use fatty meal free from bone.

***Myoporum laetum*, A Suspected Poisonous Plant, in New Zealand.** — *Journal of the New Zealand Dept., of Agriculture*. Vol. 2, No. 6, p. 348. Wellington, June 15, 1911. 2760

From time to time, the "Ngaio" (*Myoporum laetum*) a spontaneous tree, very widespread on the coast of the Islands of New Zealand, is said to cause some cattle mortality. New Zealand Other Myoporineae have also been reported as poisonous, and the best known example is that of the "Ellangowan Poison-Bush" (*Myoporum deserti*). With regard to this plant, Bailey in the "Weeds and Poisonous plants of Queensland" writes; "This plant has caused great damage to flocks of sheep, while moving from one pasture to another, particularly on the road from Dalley to Leyburn, via Yandilla". On the contrary, von Muller in his "Extra-tropical plants" regards a closely allied plant, *Myoporum insulare*, as a good forage plant, and also records the fact that cattle and sheep browse on the "Ngaio".

Turner, in " Forage Plants of Australia " says that the Ellangowan Poison-Bush and some of its congeners have been suspected of poisoning cattle and sheep, when in full-fruit. His personal observations however enabled him to regard this plant as a good fodder in times of scarcity.

The writer has no knowledge of any investigations to determine the presence of a poisonous alkaloid in *Myoporum* (1). Bailey's remark seems to indicate that pasture-changing sheep are more liable to be poisoned by the Ellangowan Poison-bush, but it should be remembered that it resembles the " Tutu " (*Coriaria ruscifolia*) a spontaneous plant which is highly dangerous to animals not used to it, especially when going from place to place or short of food. On the other hand, cattle used to " Tutu ", and eating it mixed with other grasses, do not seem to experience bad effects. The same may be the case with the genus *Myoporum*.

The leaves of " Ngaio " are used as an infusion against the stings of mosquitos.

2761 PETER and PLAB. **Cattle Raising in Lower Rottal, Bavaria.** (Die Rindviehzucht des Unteren Rottales). — *Deutsche Landwirtschaftliche Presse*. No. 50, S. 590-591. Berlin, 24 Juni 1911.

The Rottal live stock are the most remarkable in all Bavaria, and their importance is so much greater because together with a splendid strain of draught horses, fine cattle are reared.

rmany: avaria The Rottal horses are the only ones in South Germany which can rival those of Oldenbourg, Hanover and East Friesland.

The cattle which had at first felt the influence of the Pinzgau breed, crossed with the native strain, is to-day on the contrary of the Piebald breed.

The object of breeding in the Rottal is to have an excellent medium stram for work, easily fattened and good milk producers, and possessing the characters of the Miesbach-Simmenthal.

The coat of these oxen is piebald-yellow and yellowish red.

A Herd book has been introduced in this region. In 5 weeks the calves attain the weight of 100 kg.

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(1) *Myoporum platycarpum* produces the *Manna* of Australia. See C. WEHMER, *Pflanzenstoffe*, Jena, 1911, p. 710. BAILEY (*Cyclopedia of American Horticulture*. Vol. II. p. 1051, New York 1906) refers to *Myoporum laetum* among ornamental plants and suggests the introduction of *Myoporum* along the coasts of South California. (*Ed.*).

BERTHOLD. **Stock breeding in German South West Africa. Herrero and African Stocks.** (Etwas von der Viehwirtschaft in Südwest Afrika). — *Deutsche Kolonialzeitung*. No. 25, S. 417-420. Berlin 24 Juni 1911. 2762

From the point of view of climate and general conditions, few countries are better adapted than German Southwest Africa for stock breeding. Moreover, this colony possesses the advantage of varied pasture lands, including bush pasture land, which renders it possible to rear sheep and ostriches in addition to oxen and horses. German S. W. Afri

In order to stimulate and improve breeding, products of the best crossings of horses, oxen, wool-sheep, Angora goats, Karakul ewes (1) poultry, bees, etc. have been imported.

Herrero oxen require a long time to develop. They are slender and long-horned, a native character, originating in the arid regions. For ploughing, a team of 8 is used, in order to more easily break up the arid clay crust of the soil. Artesian wells are sunk to water the oxen.

Herrero oxen are too high on the legs, their muscles are poorly covered with fat and they do not weigh more than 200 kg. The cows do not readily submit to milking.

On the contrary, the strain known as the *African* is short horned, and recalls the Dutch and Friesian breeds.

The *African* breed differs from the *Herrero*, in that it fattens more, and some animals attain the weight of 300 kg. The milk it gives is not abundant but it is excellent.

In 1910 there were in the Colony 121,439 head of cattle, not a large number in relation to the extent of the colony, but remarkable in comparison with previous figures.

The sheep are more important. During the hot summer they accumulate stores of fat which they consume during the winter. Nevertheless they are gradually being replaced by those imported for the production of wool. In 1910 344,000 native sheep were raised for slaughter and 29,200 imported sheep for wool.

Only one-fifteenth part of the colony is used as pasture land, by the present quantity of stock.

A greater spirit of enterprise could thus provide the country with enormous revenues and profits, which would still further increase by the rearing of Angora goats and ostriches, which have already been introduced.

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(1) See Abstr. 1828 *Bull.* June 1911 and below, Abstr. 2771. (*Ed.*)

2763 J. G. RUTHERFORD. **The Licensing of Stallions to Improve Horse Breeding.** — *The Report of the Agricultural Societies of Ontario for* 1911, *Department of Agriculture,* Toronto, Canada, pp. 20-28.

anada: oronto

This is a popular paper, prepared and read before the Convention of the Ontario Fairs and Exhibitions Association, by the Veterinary-Director-General and Live Stock Commissioner, on the advantages of a government supervision of service stallions. The writer refers to the results of an inspection by the province of the breeding horses which showed that in one county 92 per cent. of the stallions were found to be sound and registered in a recognized Stud-Book, while in another the percentage of such animals was only 16. These were the extremes. The observation is made that " It is a matter of common knowledge that the horses produced in the counties shown to have the highest percentage of pure bred registered sires are, as a rule, infinitely better and more valuable than those produced in the counties showing the opposite condition ".

The great advantage of a licensing system, based on intelligent inspection, is the preventing of misrepresentation by owners of grade and unsound stallions, as under such a system the official certificate which must accompany the horse during the breeding season shows plainly what manner of animal he is.

The writer, who originated the first legislation relative to licensing in Canada, included in his paper a copy of the " Horse Breeder's License Act " which is in force in the province of Manitoba. It was pointed out that similar Acts are in force in the provinces of Saskatchewan and Alberta and they are having a most salutary effect upon the horse-breeding industry of these provinces.

2764 C. van DAMME. **Notes on the Mule Breeding Industry in Poitou.** — *Bulletin Agricole du Congo Belge,* Vol. II. No. 2, pp. 197-202. Bruxelles, Juin, 1911.

The mule breeding industry has fallen off considerably since the production of the small sized mule became less important.

rance: Poitou

The centre of this industry lies chiefly in the districts of Melle, Niort and Parthenay-le-Comte in Vendée. Some cantons of the departments of Vienne, Charente and Charente Inférieure also engage in the industry.

The mule being a product of the mare and the ass, the mule-breeding industry involves the production of these two progenitors.

The mare serving as mule dam. — The mare for this purpose, sought after in Poitou, is an animal of very broad build, from 1.60 to 1.65 m.,

(16 to 16 ½ hands) high with rather long head and neck, prominent withers, well sustained back, wide crupper, powerful limbs with plenty of hair at the hocks, and wide hoofs well open at the heels.

The Stallion ass. — The ass intended to cover the brood mare is an animal of full build, 1.40 to 1.50 m. (14 to 15 hands) high. It has a big head, ears long and standing out, thick neck, broad and deep chest, well sustained back, wide crupper, buttocks coming down low, well developed body and powerful limbs. Its coat varies from dark bay to black in colour ; those with long and woolly hair are much sought after.

The production of these asses is very limited. In consequence they sell at very high prices, ranging from 3,000 to 6,000 francs (£.120 to 240) and at times amounting to 8,000 to 10,000 francs (£.320 to 400).

The Mule. — The mule in Poitou, produced from the mare and the ass, is a very powerful draught animal, standing m. 1.55 to 1.65 (15 ½ to 16 ½ hands) high, and even reaching m. 1.70. (17 h.). It is an animal very frugal in its wants, long lived and having great powers of resistance to hot and moist climates, where the horse lives with difficulty. It is estimated that 10,000 to 12,000 mules are born in Poitou per year, from the 20,000 mares who are served by the asses. The males, known as " jetons ", are sold after weaning, between November and January, at the local fairs, to dealers, who convey them to Isère, Drome, Vaucluse, etc. Most of them are castrated ; those which promise to be big animals are left entire, and used later to do shaft work, as seen on the wharves at Marseilles. These young mules are sold at from 400 to 600 francs, (£.16 to 24) sometimes fetching 700 to 800 francs (£.28 to 32).

The young female mules, or " jetonnes " are generally kept to the age of 3 ½ or 4 ½ years. They are then sold at prices varying from 1200 to 1800 francs, (£.48 to 72) for the use of vine-growers in Aude, Hérault, Gard, Pyrenées Orientales, etc. Mules of less height than m. 1.55 (15 ½ hands) sell at 800 to 1000 francs (£.32 to 40) and are chiefly exported.

Rearing Indian and African Zebus in Germany. Die Züchtungen mit Buckelrindern (*Bos indicus*) aus Indien und aus Afrika). — *Deutsche Landwirtschaftliche Presse* No. 46, S. 537. Berlin, 10 Juni 1911. 2765

Various experiments have been carried out in Germany to see whether the crossing of the native strains with Zebus from Africa or Germany

India might be of advantage to the production of meat. They yielded the following results:

1. A product of the cross of a Zebu and a black cow of the plains, though badly shaped and very long legged, attained the weight of 800 kg. in full maturity, and without special feeding.

2. Two cows, produced by crossing Zebu with Simmenthal and Zebu with Guernsey, lost the Zebu type almost entirely; they produced few calves and very little milk.

3. A cow, a cross of the Zebu and the Friesian breed, calved almost regularly and produced abundant milk.

4. The type obtained is certainly not the ideal for the improvement of the native German stock.

5. In all cases the products of the cross show a special disposition for fattening.

6. The proportion of fat in the milk of the cross breds is high, but only when the quantity of milk yielded is very low.

Naturally these results would be of much greater value, if it were a question of crossing, not for Germany, but for the German Colonies.

2766 JAMES W. WILSON. **Fattening Steers of Different Ages.** — *South Dakota Agricultural Experiment Station*, Bulletin No. 125, Brookings S. D., March 1911.

The object of this experiment was to ascertain the gain to be made on steers of the same quality, but of different ages under the same conditions, with the same kind of grain ration.

United States: Dakota

It was also desired to determine the difference in the production of pork for feed consumed by shotes following the different aged steers.

The following table shows the total pounds of feed consumed, total gain, total pounds of pork produced, and average pounds of each for pound of gain, for both cattle and hogs, for both lots in both experiments.

The following conclusions are drawn hy the writer from these experiments:

	12 Three-year old steers	12 Two-years old steers	12 Yearling steers
Total pounds of concentrates fed .	33 978	29 833	25 711
Total gain	4 003	3 773	3 820
Average lbs. of concentrates for pound of gain	8.48	7.90	6.73
Total pounds of hay fed	20 329	17 543	16 602
Average lbs. of hay for pound of gain	5.08	4.64	4.34
Pounds of pork produced	782	738	389
Average lbs. concentrates for pound of pork	43.4	40.4	66.1

1) Hogs made more gain following three year old steers than when following yearling steers.

2) The younger the steer the fewer the pounds of feed for a pound of gain.

3) The loss in shipping per head was greater when the cattle were fed sheaf oats en route than when they were fed prairie hay.

4) The largest gain for feed consumed was made during the first thirty days when the steers were being put on full feed.

5) A longer feeding period was required to get yearling steers in a good marketable condition than was required for the two year old or three year old steers.

6) More grain was required for a pound of gain during cold than moderate weather, indicating that a large per cent of the feed was required for maintaining body heat.

7) Only six pounds more gain was made by the three year olds than the two year olds, and only nine pounds more was made by the two year old than the yearlings, per head, showing that practically equal gains can be made with steers of different ages under the same conditions.

8) Where the ration was mixed with one tenth, by weight, of oil-meal the three year old steers consumed an average of forty-five bushels, the two year olds an average of forty bushels and the yearlings an average of thirty-four bushels of corn per head during the feeding period of 127 days.

9) With the three year old and the two year old lots, a pound of pork was made for every five pounds of beef produced, while with the yearling lots, one pound of pork was made for every nine pounds of beef. The production of pork being an important item in steer feeding operations, and as experiments show that it is not profitable to grind corn for steers (unless to increase the palatability), the combined gain of both cattle and hogs should be considered by the prospective feeder.

M. J. BEATTY. **A New Method of Watering Cows.** — *Farmers' Advocate.* London, Canada Vol. 46, No. 987, 24 August, 1911, p. 1387. **2767**

The writer recommends watering the cows in the feed manger, which should consist of a continuous cement trough for each row of cows, extending clear through the stable, and having a fall of one inch in forty feet. At the lower end, a trap is built in the bottom of the trough to carry off the waste water. **Canada**

A tap is put at the upper end of each row. When it is desired to water the cows, the mangers are swept and flushed, then the stopper is put in at the lower end and the water admitted.

This system has the advantage of costing nothing, except the drainage and water supply pipe with tap.

It keeps the manger always sweet and clean.

2768 **Sheep Raising in Southern Chile.** — *The Times South American Supplement.* No. 12, p. 34. London, June, 27, 1911.

Three leagues to the east of Punta Arena is the freezing establishment of Rio Seco, which can deal with 2 500 sheep daily during the slaughtering season in late summer and autumn.

Chile

The Company "La Sociedad Explotadora de Tierra del Fuego" occupies under lease from the Chilian Government 3 334 500 acres of public land. In addition to this, it is absolute owner of over two million acres of freehold land, most of which lies in Chilian Patagonia. At the recent shearing 1 600 000 sheep were counted, besides about 23 000 horned cattle and 9 000 horses.

In 1909 the company tinned 40 000 sheep at its own canning factory; its three try-works or *graserias*, that is to say, tallow-producing factories, boiled down 60 000 of its sheep, besides 160 000 boiled down for neighbouring *estancieros*,

In any case, the future of sheep-farming in Tierra del Fuego and Southern Patagonia is assured. A country which was regarded as a desert now produces great quantities of wool and meat; indeed, it may be said that a new province has been won for Chile through the work of internal settlement and development.

2769 J. Wrenford Mathews. **Experiments in Docking Lambs' Tails.** — *Agricultural Gazette of New South Wales,* Vol. XXII, Part. 7, Sydney, July 3, 1911.

Concerning the merits of the searing-iron as compared with the knife for removing lambs' tails, there has existed for some time past considerable difference of opinion among breeders and sheep men in general.

ustralia : . S. Wales

The controversy has assumed such importance that about this time last year a series of experiments were undertaken at the instance of the Minister of Agriculture of N. S. Wales.

The lambs tested comprised the whole year's drop, in order to guard against error by making as large a number of observations

as possible. The lambs were weighed at regular monthly intervals from just before marking until they were weaned. Both ewe and wether lambs were treated. All details with respect to the condition of the wound and the time occupied in healing were recorded by the managers of the different farms concerned, and are appended to this article.

These reports show no difference, or, at all events, no significant difference, between the lambs that were seared and those which were knifed, at any of the weighings. Any difference is in favour of the knifed lambs, but it would be a mistake to attach much importance to this result particularly since it was obtained in one season only. There was however, a very considerable diference in the nature of the wounds.

Those which were seared showed comparatively much greater inflammation and the wounds took much longer to heal; whereas those knifed healed quickly and exhibited a clean sore. The seared lambs showed signs of festering, and much swelling was noticeable around the stump, extending along the spine as far as the lumbar region and even further along the back. On breaking the scab, a considerable quantity of pus exuded. Even though the appearance of the part was outwardly healthy yet the sore had eaten deeply into the bony core of the tail. The lambs knifed had all healed within the month; but in the case of the seared lambs, the inflammation persisted in some cases for five or even six weeks. (1)

Sheep Breeding in Corsica. — *Live Stock Journal*, No. 1953, p. 256. London, Sept. 8, 1911. 2770

The breeding of sheep is carried on to some extent in the island of Corsica, and the general results are successful. Although small, the sheep are very hardy, and their wool is considered by experts Corsica to be of thoroughly good quality. The price of sheep's milk is 26 c. (2 ½ *d*) per litre, and it finds a ready market for the making of Roquefort cheese. The law passed in France in favour of agricultural associations has had a great effect in Corsica, and the Syndicat Agricole, whose headquarters are at Bastia, has established many

(1) Mr. HAROLD SEENY, on the contrary, is of opinion that the searing process is to be preferred as being more aseptic, and preventing any subsequent haemorrhage. See HAROLD SEENEY: Docking, *Standard Cyclopedia of Modern Agriculture*, edit. by R. P. WRIGHT, Vol. IV. p. 165, London, 1909. (*Ed.*).

local branches for the purpose of advancing the interests of sheep breeding and similar industries.

The syndicate has also formed sub-syndicates for the raising of cattle, for mutual insurance against the mortality of cattle, and for a co-operative society for the sale of milk.

A new Corsican Society has been started for the manufacture of Roquefort cheese, in which sheep's milk is used; these institutions are managed by competent men who are versed in business transactions, and their object is to export Corsican products to the United Kingdom. Their success is anticipated with confidence.

Meanwhile, the sheep breeders continue to be busy, obtaining a satisfactory return, and the improved organisation now provided for their benefit is appreciated.

771

Breeding " Karakul " Sheep in Central Asia. (Die Karakul-Schafzucht in Mittelasien). — *Deutsches Kolonialblatt.* No. 13, P. 497. Berlin, 1 Juli 1911.

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The Karakul sheep imported in ancient times by the Arabs are very important for breeding in Central Asia. They are found chiefly disseminated in Bokhara, and the centre of trade in these skins is Karakul. To obtain the celebrated lamb skins, the little lambs are killed before the first week of their life has expired. The price of each of these skins may vary from 7 to 10 roubles (about 14s to 21s). The skins are shipped at Krasnowodsk and leave for Europe via Batum. The annual exports are about 35,000 poods (about 11,200 cwt). It is also calculated that from the whole of Russian Central Asia there are exported yearly 1,500,000 to 2,000,000 Karakul skins. With a view to encouraging breeding of the Karakul in Transcaucasia, the Government has founded a breeding Station at Bakraw, which counts already more than 400 head.

Each head of Karakul is worth 8 to 15 roubles.

This industry will be tried in the Crimea, as well as in the Governments of Southern Russia and the Northern Caucasus (1).

2772

Fecundity of Sheep. (*Royal Agric. Coll, Cirencester, Scientific Bull.* No. 2, 1910) Abs.: *The Journal of the Board of Agriculture* Vol, XVIII. No. 5 p. 418. London, August 1911.

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It is generally held that, in the case of animals having usually one or two young at a birth, the disposition to bear twins is hereditary, and this work has for its object the investigation of the

(1) See this *Bull,* for July 1911. Abs. 1828 and above, Abs. 2762. (*Ed.*).

point in the case of sheep. In July, 1909, twelve pedigree Oxford Down twin yearling ewes were purchased, six from mixed twins, and the other six from ewe twins. (In this report the three kinds of twins are spoken of as (1) ram twins, *i. e.*, both male; (2) ewe twins, *i. e.*, both female; (3) mixed twins, *i. e.*, one of each sex). In the autumn these ewes were put to a pedigree Oxford Down ram twin, and lambs were dropped as follows:

Lot. I. - Mixed Twin Ewes (1 ewe died after lambing)	9 lambs from 6 ewes, including 2 pairs of mixed twins and 1 of ewe twins.
Lot II. - Ewe Twins	5 lambs from 5 ewes. No twins.

The next season, with the same ram and ewes, the results were:

Lot I. - Mixed Twin Ewes	9 lambs from 5 ewes, including 3 pairs of mixed twins and 1 pair of ewe twins.
Lot II. - Ewe Twins	6 lambs from 6 ewes. No twins.

All the twins were born by the ewes from mixed twins, and the ewe twins nearly all produced ram lambs. The experimental flock is too small., however, and the results so far obtained too few, to justify more than very tentative conclusions.

Public Sheep Sales. — *The Nor' West Farmer, Winnipeg.* Canada, Vol. 30, No. 16, August 21, 1911, p. 1008. **2773**

To encourage the sheep raising industry in the province of Manitoba, the Manitoba Sheep Breeders' Association is making arrangements to hold public auction sales of breeding sheep at five or six points, about the middle of October. At each place, about one hundred head will be sold. The offerings will consist of grade ewes as well as purebred rams and ewes, the former not to exceed four years and the latter three years. The sheep will be supplied by breeders who will receive the full selling price, the Association defraying the expenses of the sales. No one contributor can supply more than three rams and ten pure-bred ewes, nor more than ten grade ewes. **Canada Manitoba**

FRANZ LEHMANN. **On the Food Requirements and Yield of the Sow during the Period of Lactation.** (Über den Futterbedarf und die Leistung des säugenden Mutterschweines). — *Journal für Landwirschaft,* 59 Band, Heft III; pp. 317-363, Berlin 1911. **2774**

Experiments in the feeding of young pigs, subjected to fattening at the age of 10 weeks, at the Station at Göttingen, had shown **Germany Göttingen**

that the young pigs, especially during the first two months of fattening, were capable of utilising to the very greatest extent an increase of protein in their food rations. It is a well established fact that during the period of growth chiefly, young animals produce meat very easily. The problem, which the author set himself in these new experiments, was to ascertain whether it was not desirable to increase the protein in the food rations of sows during the suckling period, and even during pregnancy, in order to obtain an increase of the live weight of the young pigs.

An increase in the quantity of protein, for two to three weeks, in the food rations given to sows during gestation produced an increase in the live weight of each young pig when born. During the lactation period the increase was 35 %. The difference in yield of the two rations becomes evident, especially if the food consumed for every 100 kg. increase in weight of the young pigs is calculated.

	Barley	Fish Meal	Meat Meal	Chaff
Ration *A*	455 kg.	8.8 kg.	— kg.	4.7 kg. (1)
Ration *B*	327 »	13.4 »	14.3 »	4.7 »

Where the production of young pigs of high weight is required in practice, these figures may serve for guidance in the selection of rations.

The author will continue his investigations in order to see how the pigs obtained by this feeding behave later on.

K. Stoeren and A. Lalim. **Influence Exercised by Turnips on the Quality of Milk.** — *Laiterie et Elevage*, 6e an. No. 15, pp. 113-114, Louvain, 1 Août 1911.

2775

The importance of root fodder in dairy production becomes greater and greater. In Norway turnips present a special interest. Messrs. Kr. Stoeren and A. Lalim, of the Higher School of Agriculture at Aas in Norway, have presented to the International Dairy Congress in Stockolm, a report on this subject of which the following

Norway

is a summary.

In order to secure if possible a satisfactory explanation of the effects exerted by turnips, the writers studied, on 5 cows, the different characteristics of the milk taken partly from turnip fed cows and partly from cows fed without turnips, but living in both cases a similar life. The following are the conclusions which they drew from these experiments :

(1) 1 kg. = 2,2046.

1. The result of these investigations confirms the supposition that the disagreeable smell and taste of the milk of cows fed on turnips are caused by digestive troubles, and by the resulting difficulty in keeping the cows absolutely clean, and the cowshed atmosphere pure and fresh.

2. The acidity of the milk is increased by turnip feeding. There was no opportunity for making analyses of the fodder. Nevertheless, to judge by the literature on the composition of the fodders used during the experiments, the quantity of phosphoric acid received during the period of experiment, by the turnip fed cows, must have been 25 % greater than during the preliminary period (120 and 92 grammes respectively per cow per day). The increased acidity may be attributed to the fact that larger quantities of phosphoric acid passed into the milk.

3. The capacity of coagulation of the milk, which is greater for the turnip fed cows, depends upon the increase of acidity, but it is not impossible that the greater quantity of lime which passed into the milk may have contributed to this result. The calcium content of the turnip food was approximately 100 % greater than that of the normal fodder (232 and 115 grammes respectively). The fact that the capacity of coagulation becomes greater when the cows are supplied with turnips has, for that matter, been proved in practice.

4. Presuming that suitable fodder is given, and that absolute cleanliness is observed during milking, the turnip, all other things being equal, excercises no unfavourable influence on milk, from the bacteriological point of view.

5. The experiments seem to indicate that the reason why milk becomes more suitable for the manufacture of certain cheeses when the cow is turnip fed, is that turnips act favourably on the composition of salts and on the capacity of coagulation of the milk.

A. Morgen, C. Beger and F. Westhausser. **The Effect of Extracts Made from Mangels and from Dried Sugar Beet Slices on the Fatty Content of Milk.** (Ueber den Einfluss der aus Futterrüben und Trockenschnitzeln hergestellten Extrakte auf den Fettgehalt der Milch.). — *Die landw. Versuchsstationen.* Band LXXV, Heft V, No. VI. pp. 349-356. Berlin 1911. 2776

These Experiments carried out in 1910 at Hohenheim, Württemberg, the Royal Agricultural Experiment Station, failed to show any effect on the fatty content of the milk through the mangel and

Germany: Württemberg

sugar beet slices extracts. This agrees, as regards the latter extract, with results previously obtained, while with regard to the mangel extract two out of three previous experiments appeared to show a certain (favourable) effect.

This disagreement of result may perhaps be attributed to the individual organism.

2777 **Influence of Fertilized Pastures on the Production of Milk.** See above, Abstr. No. 2569.

2778 L. LINDET. **Mechanical Cow Milking.** — *L'Industrie Laitière*, 36e An. No. 31, pp. 504-509. Paris, 30 Juillet, 1911.

The author describes the four appliances submitted both to the Agricultural Committee of Lille and for the comparative experiments carried out at the Agricultural Farm of Gournay-sur-Marne, by the agricultural engineer J. Lucas, with the co-operation of the Meaux Society of Agriculture, and under the direction of Prof. Mallevre of the Agricultural Institute of Paris.

France: Seine and Oise

The Wallace apparatus operates by the action of a partial vacuum amounting to 40 cm. (16 inches) of mercury, produced by a pump which rarefies the air of a reservoir. This pump is driven by animal power or a steam or gas or spirit motor — but best of all by an electric motor. With the reservoir there is connected a pipe having nozzles fitted with cocks, which is suitably fixed along the shed, above the mangers ; the rubber pipes of the milking apparatus are fixed to one of these nozzles nearest to the cow to be milked. The apparatus is formed of 4 independent suckers connected by 4 rubber pipes to a small flat box, to which a rubber pipe is joined, enabling the milk to pass into a closed pail, itself in communication by means of another rubber pipe, with the suction pipe. The sucker comprises an aluminium cylinder called a " milking-goblet, " inside which is a rubber sleeve slightly flattened on three faces which is applied to the teat. This rubber sleeve is in communication with two small piston cylinders, called " pulsators "mounted at the base of the aluminium cylinder, one of which acts as a valve to the other, and which operate under the action of the partial vacuum in the apparatus. When the piston creates a vacuum between the dug and the rubber piece, the latter lies firmly on the former ; then a movement of the piston permits the air to re-enter, and detaches the piece of rubber, replacing it once more against the dug imme-

diately after. These alternating movements of compression and depression allow of obtaining the effects produced by a sucking calf or by milking by hand.

The Max appliance is similar, but the suckers are driven by a single pulsator which acts on the 4 teats at the same time.

The Alfa appliance compresses the teats which are enclosed in a rubber casing by means of a jaw, the parts of which are driven by compressed air.

The Brohet apparatus is similar to the last named, but the compression of the teat is obtained by a rubber wheel which runs from top to bottom of the teat, the latter resting against a spring plate. This appliance works by hand ; it is intended to enable an unskilled person to replace the milker emergency.

At Gournay, Mr. Lucas selected 12 cows similar in every respect, from his herd. After a first period, during which the cows were milked by hand, the 12 cows were divided into three lots of 4 each. During a second period (2 months) one of the lots continued to be milked by a skilled man, the other two were milked, one with the Wallace machine, the other with the Max machine.

The quantities and richness in fat of this milk were found to be practically equal during the first and second period ; the functioning of the udder having been the same, both by hand and by machine.

The milking machines do not always completely drain the teats, especially in the first attempts, owing to the nervousness of the animals subjected to the trial, and stripping by hand sometimes yielded 10 % more of the milk previously drawn by machine. But this percentage fell off subsequently owing to the cows growing accustomed to the new method.

M. Mallevre has observed that thorough milking is more certain in proportion as the teats are larger and longer. Therefore the makers must adapt the rubber sleeves to the size of the teats. He also observed that the use of the appliances does not inflame the teats. To prevent blood being drawn at the end of the milking, the staff must be required to exercise careful supervision. The Wallace machine includes a small metal box into which the milk from the four teats passes. As soon as it cools the udders must be massaged and the end of the operation carefully watched.

These apparatus must be kept very clean ; they can easily be taken to pieces and must after each milking be washed with water containing carbonate of soda, formalin or oxygenised water.

MM. Mallevre and Lucas assume that mechanical milking can only be applied to a shed of at least 50 cows. The writer finds this condition somewhat stringent, and mentions herds of 16 and even 8 cows where mechanical milking is employed.

2779 P. DAIRE. **The Hygiene of Milking.** — *L'Industrie du Beurre.* 6e An. No. 21, Pp. 241-242. Niort, 21 Mai 1911.

Though it is almost impossible to obtain scrupulous asepsis in milking, nevertheless a clean, good, sweet milk, may be obtained by following the hygienic rules laid down by the writer.

France

Before milking, the hind quarters and the udders should be washed with warm water so as to remove all trace of litter. The tail of the animal should also be kept still during the operation.

The milker must put on a clean blouse and wash his hands at the time of milking. He will avoid touching litter and forage.

Milking must be carried out a good time after the meals of the animals, in the open air if possible, and when the atmosphere is calm.

Finally, the vessels used must be thoroughly clean.

They must be made of metal and scalded before milking.

The following figures show the very great importance of this remark.

	Germs per cub. centimetre of milk found in	
	Flask sterilized by fire	usual can
Experiment No. 1	640	1 400
» » 2	630	11 400
» » 3	120	15 540
» » 4	780	30 700
» » 5	140	720

2780 CHAS. F. BRISCOE and W. J. MAC NEAL. **Tuberculosis of Farm Animals.** — *University of Illinois. Agricultural Experiment Station - Bulletin,* No. 149, pp. 314-431. Urbana, Ill. February 1911.

The Bulletin under review may be summarized as follows:

United States: Illinois

1. Tuberculosis was known as early as 460 B. C. It is a disease due to a specific organism, *B. tuberculosis.* Four types of this organism are recognized; the human, bovine, avian, and a type belonging to cold blooded animals.

2. The disease is characterized by the formation of tubercles as a reaction of the animal tissues. The tubercle bacilli may enter the body through the act of breathing, or eating and through wounds; and leave the body through the mouth or nose, or in the milk, faeces, urine, genital discharges, or discharges from wounds. The tuberculous animal rarely shows physical signs until the last stages of the disease.

3. In determining the presence or absence of tubercle bacilli in material supposed to be infectious, the method of animal inoculation is far superior to that of microscopical examination. This is true because of the difficulty of distinguishing the tubercle bacilli from other acid-fast bacilli, and the difficulty of finding them when present in small numbers.

4. Tubercle bacilli are widely distributed in market butter. Of a total of 1 233 butter tests recorded in the literature, 163, or 13.2 per cent, were positive; of 209 oleomargarine tests, 9, or 4.3 per cent, were positive.

5. The percentage of samples containing tubercle bacilli shows no decrease, when the work of the last few years is compared with the first work done twenty years ago.

6. Tubercle bacilli remain virulent in butter as ordinarily salted, for more than five months.

7. Two of six samples of butter tested by the writers contained tubercle bacilli virulent to Guinea pigs.

8. There is recorded, in the literature, the testing of 7 845 samples of market milk for tubercle bacilli, of which 537, or 6.8 per cent, contained this organism. In the United States three writers (Anderson, Fields and Hess) found tubercle bacilli present in 78, or 17.5 per cent, of a total of 447 samples of milk tested, while in continental Europe (Mueller, Beatty, Schmidt and Eber found this organism present in 205, or 4.8 per cent, of 4 229 samples tested.

9. In 37 samples of market milk tested at the Illinois Agricult. Exp. Station no tubercle bacilli were found.

10. Tubercle bacilli have been found in the milk from tuberculous cows with sound udders, by many reliable investigators. These bacteria probably in most cases gained access to the milk from other sources (manure, urine, dust) than the interior of the udder.

11. Tubercle bacilli are rarely excreted in the milk of tuberculous cows with sound udders, especially if the infection is localized; when the infection is generalized, or when tubercle bacilli are free in the blood, these organisms may be excreted along with the milk.

12. Forty-seven samples of milk from 10 tuberculous cows, tested by the writers, gave wholly negative results. None of the 10 cows was found to be extensively tuberculous *post mortem*.

13. Guinea pig inoculation tests are superior to microscopic tests in detecting the presence of tubercle bacilli in cow manure. By inoculation tests, tubercle bacilli, in a suspension of fresh cow

manure can be detected when present in an amount as small as one hundred billionth of a gram in the dose injected.

14. Ordinarily only a small percentage of tuberculous cattle are excreting virulent tubercle bacilli in their faeces at any given time.

15. At the Illinois Agric. Exp. Station 97 samples of faeces from 62 cattle have been tested for tubercle bacilli by inoculation of guinea pigs. These organisms have been found 4 times in samples from 3 of the cows.

16. At present the results of different investigators in detecting tubercle bacilli in the circulating blood are conflicting. This difference may be due to the amount of sample injected into the test animal; the larger the amount of sample, the larger the percentage of positive findings.

17. The contention of Bosenberger that tubercle bacilli are frequently found in the blood by microscopic test has not been confirmed by other workers.

18. As a diagnostic procedure the examination of the blood for tubercle bacilli is of little value.

19. Twelve samples of blood from 8 animals were tested for tubercle bacilli, both by the Rosenberger method and by guinea pig inoculations. No test showed the presence of these organisms.

20. There are about 200 000 deaths annually in the United States from tuberculosis, of which it is estimated (Park and Krumwiede) that 92 per cent are caused by the human type of tubercle bacilli; and 8 per cent, or 16 000 cases, are caused by the bovine type.

21. In the cases caused by the bovine type of tubercle bacilli the disease is probably contracted very largely through the food, and is found almost exclusively among children.

22. Though our knowledge concerning the distribution of cattle tuberculosis is yet incomplete, it is known to be extensive throughout the world: ranging from 10 to 48 per cent where most testing has been done.

23. The two things most favouring the distribution of this disease are the extensive trade in tuberculous cattle, and the difficulty of recognizing the disease by physical signs until it is far advanced.

24. The recognition of tuberculosis in cattle depends almost entirely upon the tuberculin test. The positive test is accurate in about 98 per cent of the cases as shown by slaughter. The negative test is not so reliable.

25. The Bang method of handling a tuberculous herd is recommended to owners of large herds (1). A modified Bang method by means of a " Stock Owners' Association ", is recommended to owners of smaller herds.

An outline of the Bang method is as follows :

1. Apply the tuberculin test.

2. Separate the herd into reacting and non-reacting herds.

3. Provide for the two herds entirely separate stables, pastures, and attendants; if possible separate farms.

4. Thoroughly disinfect the stables, watering troughs, and all utensils coming into contact with the healthy herd.

5. Test the healthy herd every 8 months, and remove the reactors, and again thoroughly disinfect the stables.

6. Take the calves of the tuberculous herd immediately from their mothers and feed them with milk from non-reacting cows or milk pasteurized at 85° C. (Fahr. 185°).

7. Add no calves to the non-reacting herd except those showing a negative reaction to tuberculin, subcutaneously administered, at the age of 6 months.

8. No cows " bought in " must be added to the healthy herd until thoroughly tested with tuberculin.

9. All milk from the tuberculous herd must be pasteurized or sterilized before being used as food for man or animal.

10. As soon as an animal in the tuberculous herd arrives at an advanced stage of the disease indicated by physical signs, she should be immediately disposed of.

K. C. CAMPBELL. **Tubercle Bacilli in Market Milk in Philadelphia.** — *U. S. Dep. of Agr XXVI Annual Report of the Bureau of Animal Industry*, pp. 163-177. Washington, 1911. 2781

The percentage of tubercle bacilli found in the milk supply of large cities has been accurately determined in only a few instances, The results of eighteen to twenty investigations in European cities showed that 9 per cent of the milk samples contained active germs of tuberculosis.

United States : Pennsylvania. Washington D. C. New York

Anderson has shown that in Washington D. C. approximately 11 per cent of the dairies supplied milk containing virulent tubercle bacilli.

Hess has found 16 per cent of the milk supply of New York

(1) See Abstr. 1455 *Bull.* May 1911. (*Ed.*).

City to contain tubercle bacilli. A careful study of the Philadelphia milk supply leads to the following conclusions:

1. One hundred and thirty samples of Philadelphia market milk were examined, and of these 13.8 per cent were found to contain tubercle bacilli.

3. The method of commercial pasteurization used in the trade cannot be relied upon as a means of destroying disease-producing bacteria.

3. If pasteurization is to be used as a means of purifying milk, it should be done under legal regulation and official supervision.

4. A microscopic examination for determining the presence of tubercle bacilli in milk is of little value.

2782 E. C. SCHROEDER. **Medical Milk Commission and Bovine Tuberculosis.** — *U. S. Dep. of Agr. XXVI Annual Report of the Bureau Animal Industry*, pp, 193-200, Washington, 1911.

This paper was presented by the writer before the American Association of Medical Milk Commissions at St. Louis, Mo. and the conclusions reached on this important question are the following: The evidence we have to prove that tubercle bacilli derived from cattle cause tuberculosis, and fatal tuberculosis, among human beings is direct and irrefutable. The evidence we have to prove that the milk from tuberculous dairy herds frequently contains living virulent tubercle bacilli is equally direct and irrefutable. Hence no medical milk commission should consent to the certification of milk unless it is obtained from cows that are free from tuberculosis and that are kept in an environment free from tuberculous infection.

United States: Missouri

As medical milk commissions cannot reasonably restrict their good work to a rare article such as certified milk is, and must remain, for a long time to come, they should recommend some measures for the immediate protection of the milk-using public generally. Pasteurization should be recommended for all milk that is not certainly free from the germs of tuberculosis or those of other diseases. As ordinary commercially pasteurized milk has been proved to be unreliable, therefore, until official supervision of pasteurization methods is established, home pasteurization should be regarded as the best method of protection against milk-borne agents of disease.

The availability, efficiency and low cost of pasteurization should not be regarded as reasons for relaxing the efforts that have been made, through inspection, education, and otherwise, to improve, the general milk supply.

G. Moussu. **Milk from Cows suffering from Foot and Mouth Disease** (Le lait des vaches atteintes de fièvre aphteuse). — *Journal d'agriculture pratique*, 75e Ann., tome II, No. 30, pp. 108-109. Paris. 27 Juillet 1911. 2783

The milk of cows suffering from foot and mouth disease, is always contaminated, as it cannot be drawn without becoming infected, even when the udders show no vescicles. France. Italy

This milk is dangerons to all animals liable to this disease namely cattle, lambs, young pigs, etc. but not horses. It is well known that young animals are more liable to contract this disease than older ones, consequently they should never be given infected milk raw. Boiling deprives such milk of all virulence; the foot-and-mouth disease virus is very subtle and has a great power of diffusion but has very little resistance to heat.

Infected milk is not positively dangerous to man; but during periods of foot and mouth disease it has been noticed that cases of stomatitis in infants are much more frequent than at other times, and it has been clearly demonstrated in Italy that these cases of stomatitis were due to the virulence of the milk.

Sterilisation removes all danger; but as in practice it is almost impossible to carry it out everywhere, the simplest and wisest course from a hygienic point of view would be to prohibit the sale of such milk, the more so as it is only a temporary measure extending over a few weeks, during the course of the disease.

This milk might be utilized for the manufacture of butter or of cheese, as the cause of infection disappears in consequence of the fermentations which take place during the ripening of cream or the processes of cheesemaking.

Neither whey nor butter milk is really contagious, but as they are produced in the farm, that is in an infected locality, they should be submitted to the same measures of precaution as whole or skimmed milk.

The Production of Sanitary Milk. — *U. S. Deptm. Agr. Sta. Work* LXIV, *Farmers' Bulletin* No. 457, pp. 24 (20-21). Washington, July 10, 1911. 2784

The Virginia Station (*Virginia Sta. Bul.* 185) has determined the number of bacteria in milk and the relative importance of the precautions taken to avoid contamination. By actual count it was found that by sprinkling the straw bedding, so as to prevent dust United States: Virginia

and bacteria from arising, the percentage of bacteria in the milk was reduced 53 per cent. A reduction of 25 per cent was secured when a closed pail was used in milking as compared with an open one.

About 23 per cent of the bacteria were eliminated when the flanks of the well-cleaned cows were moistened before milking. Discarding the first 4 strippings from each teat was of some importance in reducing the bacterial count. These four precautions, sprinkling the bedding, moistening the flanks of the cow, using a closed pail, and discarding the first strippings, can be observed without any appreciable expense.

An experiment was also conducted by the same station to test the relative value of straw and sawdust as bedding. On actual counting there was an average of more than twice as many bacteria when straw was used as when sawdust was nsed. On the other hand, sawdust is of little value as a manure, and to some extent detracts from the value of the droppings of the cow, while straw is a good absorbent and has a value of its own as a fertilizer.

When a milking machine is used, some precautions for preventing the development of bacteria in the rubber parts must be observed. Soaking these parts in limewater is effective, and when this is done, the milk from a milking machine should contain no more bacteria than when the cows are hand-milked.

2785 **Permanent Milk Commission in Belgium.** — *L'Industrie laitière Belge*, 10ème Année, N°. 10, Pp. 75-76. Verviers, 29 Juillet, 1911.

The Permanent Milk Commission in Belgium held a general meeting on Saturday, 15th. July, under the chairmanship of M. Hansoulle.

Belgium To understand the object of this Commission, it is best to reproduce here a few clauses of its articles.

I. A Permanent Milk Commission is constituted in Belgium for the object of bringing about an improvement in the conditions of production and sale of milk, so as to guarantee the consumption by the public of a pure and healthy milk.

In order to attain its object, the Commission shall make use of all the means it may think necessary to adopt, and in particular:

(1) It shall put itself into communication with public authorities to secure their assistance and support in the work among milk producers and vendors in order that the latter shall gradually take all necessary steps in order to supply a wholesome milk under the most perfect possible hygienic and sufficiently remunerative conditions.

(2) It shall carry on active propaganda to demonstrate to the public the advantages obtainable from the consumption of wholesome milk and the benefit which may be secured from combating excessive infant mortality and contagious diseases, particularly tuberculosis.

II. This Commission, whose only object is the benefit of public health was appointed on the 8th. January, 1911 at the invitation of the Medical Veterinary Federation of Belgium. It consists of persons who have devoted special study to the milk question or who, owing to their position, are able to facilitate the carrying out by the Commission of the task which it has undertaken.

ORLA JENSEN. **Method of Supplying Large Towns with Wholesome Milk.** — *Laiterie et Elevage*, 6e Année, No. 16, Pp. 122-123, Louvain, 15 Août, 1911. 2786

The value of milk depends principally on its contents of fat, and non-fatty substances and relative absence of bacteria, and these figures should serve as a basis for inspection. The different composition of milks, however, would result in the establishment of averages which would allow of the sale of milk inferior in quality to that usually put on the market. Belgium

Therefore, the writer proposes to leave it to the associations for the sale of milk to fix the minimum of fat and the maximum of bacteria they are prepared to guarantee. The authorities would have to satisfy themselves whether the associations keep strictly to their guarantee.

Competition would result in a cheaper and better quality milk. The public will understand that milk may vary considerably as to quality. This system would eliminate small vendors who generally supply a very inferior product.

H. WEIGMANN. **The Variability of the Bacteria Affecting the Taste and Odour of Milk.** (Sur la variabilité des microbes au point de vue de la production des substances odorantes et savoureuses du lait). — *Révue Générale Agronomique*, No. 6-7, pp. 265-267, Uccle-lez-Bruxelles Juin-Juillet, 1911. 2787

With the exception of the numerous slight variations in the percentage of lactose and other milk constituents, and also of the direct influence on the taste of milk which is exercised by some food stuffs when given in large quantities, the normal taste and smell of milk are due to the bacteria present ; and any change in the former, is due to differences in the latter. Belgium

The variability of the different species of bacteria on account of the changes which are thereby brought about, is of great importance.

Each species of bacterium, which affects milk, preserves its characteristic activity. Lactic ferments, if they are strong, impart an acid taste to the milk and influence its coagulation.

The, so-called, stable taste and smell are due to the action of *Coli* (aerogenes). *Bacillus fluorescens* renders the milk very bitter, while bacteria, which attack the udder, give rise to a bitter and cheesy flavour. On repeating the experiments with milk containing pure cultures of bacilli, it was found that not only small differences in the taste and smell were brought about, but also very considerable changes resulted, some of which were of great importance to the dairy industry.

The writer has often shown the different ways in which milk is rendered acid by the action of *Bact. lactis acidi* Leichmann (syn. *Streptococcus lacticus*, or *Bact Güntheri*). Not only does one species possess the power of imparting a pleasant acid cheese-like taste which it alone can bring about, but a close observer can easily detect the strawy musty taste, due almost exclusively to the lactic ferments of straw, and the acid, penetrating flavour, and malt-like taste imparted by the lactic ferments of grass and wheat respectively.

This is of great importance to the dairy industry, as the taste of cream and butter (especially after pasteurization) depends on the culture of bacteria used. In the case of whey, which becomes acid spontaneously, the great variation in taste is probably principally due to other bacteria present, and not to the lactic ferments alone.

Slight variations in flavour become accentuated when the coagulation agent has been obtained from a pure culture.

These variations have often been observed by the writer on occasion when he failed to obtain pure cultures. On one occasion, owing to an oversight, a pure culture of lactic ferments causing a malt-like taste was supplied to a dairy with the result that the butter was all affected and its market value much reduced.

Any carelessness in the species of bacteria selected for acidifying the cream is sure to be detected.

The Aerogenic *Coli* group impart to milk the same taste that it would have if it were contaminated by the manure of a badly kept and ill-ventilated stable.

This is the special property of the group, and is to be attributed to the large amount of gas caused by these bacteria.

The common *Bact. coli* makes the milk smell like the intestines of an ox.

The above variations in bacterial action are still more noticeable when the cultures are young, this makes it probable that there is more than one species at work ; old vigorous cultures of *Coli* (aero genes) alway induce the definite « stable » taste and smell. The bacteria which give rise to a delicate strawberry or pine apple flavour, not only in an artificial culture medium, but more especially in milk, have been found to be after all the same as *Coli* or *Aerogenes*

The same applies to Reinmann's aromatic bacillus *Bact. aromaticus lactis* Grimm, *Bact, aromaticus butyri* ; Sewerin, *Bact esterificans Stralauence*; Maassen, *Bact. fragi*; Eichholz, *Pseudomonas fragariae II* Gruber (peptonizing) *Bact. acido-aromaticus*, Van der Leck, and other varieties of the Coli (aerogenes) group. (1)

GRIMMER. **The Chemistry of Milk and of Dairy Produce, during the First Nalf of the Year 1911** (Bericht über die Arbeiten auf dem gebiete der Milch chemie u. des Molkereiwesens im ersten Halbjahr 1911). — *Milchwirtsch. Zeutralblatt.* Heft 8. 7 Jahrg. pp. 327-361. Leipzig, August 1911. 2788

This paper deals in an exhaustive manner with the chemistry of milk and of milk products.

The various questions studied are the feeding of milch cows, the constituents of milk, their variation and alteration, the bacteria found in milk, together with the enzymes and antitoxins present. Germany

Also the value of milk as a food. the dairy-machinery used, methods of milk analysis and the dairy industry generally.

It was found that when cows were fed upon food containing much water such as potatoes, lucerne etc, the animals needed little to drink, but there was not much difference in the milk, while the effect of soy-bean cakes was to raise the amount of milk but not its fat content.

Experiments were made on the different kinds of milk (human milk, cows', asses' and goats' milk) showing the difference in their composition, the methods of detecting the adulteration of cows milk with that of goats. The effects of heat are also studied and it is found that the lecithins are destroyed by high temperature, in the case of butter milk, by sterilization.

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(1) On the defects of milk in general and on the tastes caused by microorganisms, see the same Author in LAFAR, *Handbuch der technischen Mikologie*, 2 Aufl., 2 B., 3 Abschn. (*Ed.*).

The changes wrought by disease, the results of Pasteurization are also treated of, together with the effect upon milk-giving animals of such chemical substances as quinine, calcium carbonate, aspirin etc.

It was found that *micrococcus melitensis* is more resistant than the bacillus of tuberculosis, and can occur in butter and in cheese unless the latter has been a long time ripening.

2789 H. Droop Richmond F. I. C. **The Composition of Milk**. — *The Analyst*, vol. XXXVI, N. 425. p. 390, London, August, 1911.

Great Britain: England

In the present communication the results of the analyses of milk during 1910 made in the laboratory of the Aylesbury Dairy Company are given. The average results of 19282 samples of milk received from the farms is given in the table below:

Average composition of milk during 1910.

MONTH	Morning Milk				Evening Milk				Mean			
	Sp. Gr.	Total Solids	Fat.	Solids not Fat.	Sp. Gr.	Total Solids	Fat.	Solids not Fat.	Sp. Gr.	Total Solids	Fat.	Solids not Fat.
		%	%	%		%	%	%		%	%	%
January	1.0321	12.50	3.62	8.88	1.0318	12.80	3.92	8.88	1.0319	12.65	3.77	8.88
February	1.0321	12.39	3.53	8.86	1.0318	12.71	3.85	8.86	1.0319	12.55	3.69	8.86
March	1.0320	12.32	3.48	8.84	1.0317	12.64	3.82	8.92	1.0319	12.48	3.65	8.83
April	1.0319	12.21	3.41	8.80	1.0316	12.59	3.80	8.79	1.0317	12.40	3.61	8.79
May	1.0322	12.11	3.28	8.83	1.0318	12.58	3.74	8.84	1.0320	12.35	3.51	8.84
June	1.0323	12.11	3.24	8.87	1.0317	12.58	3.76	8.82	1.0320	12.35	3.50	8.85
July	1.0321	12.20	3.37	8.83	1.0315	12.63	3.85	8.78	1.0318	12.42	3.61	8.81
August	1.0322	12.37	3.48	8.89	1.0317	12.86	4.00	8.86	1.0319	12.61	3.74	8.87
September	1.0324	12.56	3.60	8.96	1.0320	12.98	4.03	8.95	1.0322	12.78	3.82	8.96
October	1.0325	12.75	3.75	9.01	1.0322	13.16	4.14	9.02	1.0324	12.96	3.95	9.01
November	1.0326	12.89	3.84	9.05	1.0324	13.15	4.11	9.04	1.0325	13.02	3.97	9.05
December	1.0323	12.78	3.80	8.98	1.0322	13.04	4.04	9.00	1.0323	12.91	3.92	8.99
Average . . .	1.0322	12.43	3.53	8.90	1.0319	12.81	3.92	8.89	1.0320	12.62	3.73	8.89

The usual variations were noticed, that is, the lowest fat occurred in May and June, and the highest in October and November; the drop in solids not-fat so often found in July and August was scarcely noticed in 1910.

2790 E. PHILIPPE. **Applicability of Recent Methods for the Examination of Milk** (*Mitt. Lebensmitteluntersuch. u. Hyg.* 1911, 2, 1-36; through *Chem. Zentralbl.* 1911, I, 1447-1448). — Abstr. in. *The Analyst*, Vol. XXXVI, No. 424, p. 347. London, July, 1911.

Germany

The writer considers that a leucocyte count affords a valuable means of diagnosing disease of the udder (cf. Hewlett and others, *Analyst*, 1910, 35, 23), and that a high catalase number (1) is a certain indication of disease (*cf.* Revis. *Analyst*, 1910, 35, 359). He agrees that no lower limit can be placed on this number which he determines at 25° C., (77° Fahr.) and calculates as c. c. of oxygen split off by 100 c. c. of milk. Of 200 samples tested in this manner, 114 were found to have a catalase number of less than 20, that of 51 lay between 20 and 30, that of 17 between 30 and 40, whilst 16 were found to have a catalase number exceeding 40.

The fermentation-reductase test or M-reductase test of Sames (*Michwirtschaftl. Zentralbl.*, 1910, 6, 462) using methylene-blue solution free from formaldehyde, is said to be a certain means of determining whether milk is fresh or not; the reduction of the colour to its leucobase is due to bacterial action. A milk which is not decolorised within three hours may be passed as normal. The reductase test, or M-reductase test of Sames (*loc. cit.*), in which methylene-blue solution containing formaldehyde is used, is of doubtful value (*cf.* also Römer and Sames, *Analyst*, 1910, 35, 407), but it is said that a normal milk should decolorise the reagent within ten minutes. The writer attaches importance to the determination in milk samples of sediment, which should be affected by a gravimetric method.

(1) See Abstr. No. 1472 *Bull.* May, 1911.

H. HÖFT. **Contribution to the Study of Cornalba's Observation on the Constant Soluble Components of Milk.** (Beitrag zur Prüfung der Frage, ob Cornalba's Regel von der Konstanz löslicher Milchbestandteile auch für hiesige Milch gilt). Mitteil. aus den Arbeiten der Versuchsstation für Mölkereiwesen zu Kiel. *Milchwirtschaftl. Zentralbl.*, Heft 8, 7 Jahrgang, pp. 861-863. Leipzig, August, 1911 (1). 2791

Cornalba showed that the quantity of soluble substances in cow's milk, *i. e.* dry matter with butter and casein removed, is almost constant. Germany. Italy

From a series of observations made by the author in Kiel, the results of which are set out in this paper, the quantity of soluble compounds of the milk of 8 cows, to which the investigations related, were in almost all the cases about 6 %, with very slight fluctuations above and below. This is a confirmation of Cornalba's conclusions. The determination of casein in these experiments was made according to Schlossmann's method, while Cornalba effected precipitation with acetic acid.

Towards the close of the lactation period, there are very marked differences and fluctuations. Analagous results have been obtained in other observations, the figures of which are not given.

GRIMMER. **Contribution to the Study of Peroxidases of Milk.** (Zur Kenntnis der Milchperoxydase). (Mitteilungen aus der Milchwirtsch. Anstalt der Landw. Kammer für die Provinz Pommern). — *Milchwirtsch. Zentralblatt*, Heft 9, Pp. 395-402, Leipzig, September, 1911. 2792

The author has been led by these enquiries to the following conclusions as to the peroxidase of milk.

The oxidising action of milk cannot be brought about either by inorganic catalysers or by an alkaline reaction, because it is impossible to isolate the oxidising ferment of milk from the other compounds of an organic character. Italy

It may even be assumed that if the peroxidase is not a function of the albumen of milk, it is a function of another substance still unknown, analogous to the albumen in milk, because the peroxidases

(1) G. CORNALBA. Il valore della costante chimica del latte nella ricerca dell'annacquamento. *Rivista scientifica del latte*, Fasc. II et III. Reggio, Emilia, 1911. (*Ed.*).

behave in the same way as milk albumen, both as regards conditions of solubility and in relation to conditions of precipitation.

The transformation of albumen by heat, by the action of methyl and ethyl alcohol, acetone or a mixture of these precipitating agents with ether, by chloroform, and by the action of alkalis and more concentrated acids, also leads to the destruction of the ferment.

2793 Ch. Groud. **Goat's Milk.** — *L'industrie Laitière*, 36e An., No. 34, pp. 549-550. Paris, 20 Août 1911.

For human consumption, goat's milk has an advantage over cow's milk, being somewhat richer, its water content being less. On France the average, the percentage composition of this milk is as follows :

Butter, fat.	3.70
Casein and Albumen	4.85
Sugar	5.00
Salts	0.35
Water	86.00

The goats of Cashmere, Angola, Egypt and Nubia supply a less watery milk, much richer in butter and salts.

The goat is much more resistent to disease than the cow, particularly to tuberculosis, therefore its milk is especially valuable as food for children.

The drawback to goat's milk lies in its peculiar taste, which resembles a very faint odour of the animal. This flavour is specific to the individual, it becomes more pronounced during feeding with dry forage (generally in winter), during the hot weather, and when the lactation period is far advanced ; it diminishes on the contrary, when the goats are kept clean (1).

This flavour, when not excessive, is only a drawback in butter manufacture ; it is held rather in esteem in the milk directly consumed, and much more so for the manufacture of cheeses, which are very much in demand at the present time, and sell high.

The best method for this manufacture is to mix goat's with cow's milk.

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(1) It should be remembered that goat's milk transmits Malta fever which has caused widespread ravage in Mediterranean countries. See Brue, Sur une nouvelle forme de fievre rencontrée sur les bords de la Mediterranée, *Ann. de l'Institut Pasteur*, VIII, p. 289, Paris, 1893. (*Ed.*).

Cheese made of goat's milk being relatively dry, appears fatter and seems to retain moisture better, and therefore very small cheeses are often made, particularly in the Alps. The " Saint Marcellin " in fact, requires for each cheese only ½ litre (0.8803 pint) of milk. The cheeses sell at 15 to 20 cm. (1 ½ to 2*d*) each. Owing to their small size, they do not lend themselves to a sufficiently advanced ripening.

Fifth International Dairy Congress at Stockholm. Text of Resoiutions. 2794
— See Abstr. 2051. of this *Bulletin*, July 1911, and above, Abstr. 2428.

On the Cost Price of Milk in France. — *Revue Scientifique*, 49e A. 12e Sem. No. 12, p. 409. Paris, 23 Septembre, 1911. 2795

Milk as such was formerly an article of local trade only. The improvement of physical methods of keeping, and the rapidity of transport have resulted in the supplying of large towns within a very wide radius. France

The basin of the Yonne sends daily milk to Paris, though 175 km. (108 miles) distant.

Phylloxera having destroyed the vineyards, the latter can only be restored in part ; because to contend with southern viticulture is economically impossible. Therefore temporary grass lands are assuming growing importance, and the production of milk becomes an interesting speculation.

The Central Agricultural Society of the Yonne has just made an enquiry into the cost of the production of milk. From the examination of 500 replies it is found that in the district of Sens, which is nearest Paris, the cost price is 0.187 francs per litre (8.2*d* per gal.)

In the districts of Tonnerre and Auxerre, which have not specialised so long in dairy production, the cost price is 0.20 francs (8.8 *d* per gal.) and more.

For the whole of the department, the price would be 0.215 fr. (9.46 *d* per gal.), for small herds, and 0.188 fr. (8.27*d*), for large ones; making an average of 0.203 fr. (8.93*d*).

A milch cow can supply 9 litres (about 2 gals.) per day, or a maximum of 3 000 litres per year, (660 gals.)

There are curious anomalies between the price of butter and that of milk; sometimes these prices do not in the least correspond.

2796 **The Milk Supply in Great Britain.** — *Journal of the Royal Society of Arts*, No. 3062, p. 901. London, July 28, 1911.

The Report of the Royal Commission on tuberculosis, in London, scheduled animal infection as one cause of tuberculosis, and milk from tuberculous cows as the vehicle of the infection. Much of the milk supply of Great Britain is tuberculous, and if it is to be purified, new powers of inspections and regulation are necessary. The Dairies Bill, introduced in 1909, would have given these powers, and it is hoped that it will be reintroduced and carried this session, though, having regard to the period of the year, that seems almost too much to hope for. The Bill provides for the registration and inspection of dairies and the prohibition of the sale of tuberculous milk from an infected dairy. It is on the model of many local acts already in force, and simply makes the precaution universal. It includes provisions for the isolation, and, if necessary, the slaughter of tuberculous cattle, with compensation where equity requires it. The public health is in pressing need of some such bill.

Great Britain

2797 BIGNAMI. **The Production of Milk in Italy.** (La produzione del latte in Italia). *Il Villagio*, Anno 36, No. 1826 (27) p. 313. Milano, 1 Luglio, 1911.

At the last Udine Congress, M. Bignami gave the folowing figures on milk production :

In Italy, about 3 million milch cows are reared, producing about 35 million hectolitres of milk (792 million gals) per year. In Central and South Italy and in the Islands, many ewes and goats, which likewise yield large quantities of milk, are also reared. According to the 1908 census, the goats and sheep in Italy numbered 13.875.000.

Italy

The quantity of butter produced annually is estimated at 220 000 quintals (432 960 cwt.) ; the annual production of cheese is 1 million quintals (1 968 000 cwt.). The value of butter and cheese exported in 1910 exceeded 68 million francs (£ 2 700 000). It is deduced from these figures that the value of the milk production in Italy, including that of ewes and goats, certainly exceeds 500 million francs (£ 20 000 000) per annum.

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(1) See A. STANLEY GRIFFITH: *Royal Commission on Tuberculosis (Human and Bovine). Final Report of the Royal Commission appointed to inquire into the Relations of Human and Animal Tuberculosis. Part II. Appendix. Vol. I. Investigation of Viruses obtained from Cases of Human Tuberculosis (other than Lupus)*. 4°, pp. 543. London, 1911. (*Ed.*).

Half Yearly Exports (January-June 1911) of Milk and Dairy Products from Italy. (Esportazione semestrale, Gennaio-Giugno 1911, di latte e latticini dall'Italia). — *Ministero delle Finanze. Statistica del Commercio speciale d'Importazione ed Esportazione, dal 1° Gennaio al 31 Giugno* 1911, p. 280. Roma, 1911. 2798

The Italian exports of milk and dairy products tend to increase more and more every year. This observation is also true for 1911. On comparing the exports for the first 6 months of the last 3 years, the following figures are obtained: Italy

	Exports 1st. Jan. to 30th June		
	1911 fr.	1910 fr.	1909 fr.
Fresh milk and sterilised milk	99 252	61 794	29 860
Fresh cream, sterilised or pasteurized	5 280	10 720	52 200
Condensed milk without sugar	2 952	1 122	5 270
Sugared condensed milk	2 041 680	1 417 080	912 600
Fresh butter	5 232 885	4 983 225	4 449 500
Melted or salt butter.	416 920	663 880	642 675
Artificial butter	146 760	164 640	131 400
« Grana » cheese (Parmesan; from Lodi and Reggio Emilia	9 886 220	9 954 360	7 412 340
Emmenthal and Gruyere type of cheese	1 889 160	1 131 900	460 740
Ewe milk cheese	7 285 300	5 705 700	4 708 220
«Cacio-cavallo» cheese	853 000	642 606	500 400
Other hard cheeses.	1 215 380	2 356 320	1 133 520
Gorgonzola, Stracchino and Fontina	7 280 420	7 719 890	6 354 170
Other soft cheeses	165 060	122 400	62 100
Total half yearly exports	36 520 269	35 035 637	26 854 995

From these figures it may be judged which milk products today possess the greatest importance for Italy in the international market, and which of them promise in the future to become still more important.

2799 CLAINE (French Consul). **Exports of Milk, Butter and of Other Farm Produce from Finland in 1909.** — *Rapports commerciaux*, N. 954, Pp. 8-10. Paris, 17 Août 1911.

Finland

Butter undoubtedly is the most important farm product in Finland. Yet the quantity exported has diminished of late years. This is attributed to unfavourable conditions of the pastures and forages.

The exports of butter show the following fluctuations:

1906	tons	15 056
1907	»	12 712
1908	»	12 034
1909	»	11 632

England continues to take the greater part of Finnish butter. In 1909 83 % of the total production was exported to that country. As regards other dairy produce, the exports of cheese show progressive figures, not only in quantity but also in value, owing to the high prices.

The exportation of milk and cream continued in 1909 to show the constant increase previously recorded.

These are exported almost exclusively to Russia.

2800 **Butter and Milk Imports in the United Kingdom in 1910.** — *L'Agriculture commerciale*, No. 17, p. 463, 1er Septembre 1911.

United Kingdom

The imports of butter and milk into England increase constantly, as is proved by the following figures, giving the yearly averages of these imports during the last quinquennial periods.

	cwt.
1886- 90	1 736 738
1891- 95	2 409 317
1896-900	3 246 608
1901- 05	4 025 478
1906- 10	4 229 317

In 1910 the imports of butter amounted to 4 325 539 cwt., of which 1 049 246 came from the British Colonies, principally Australia, and New Zealand, and 3 276 293 from foreign countries.

The share of France in this latter figure is 361 249 cwt. or 11 % only. The imports from Denmark amounted to 1 726 091 cwt., from Russia to 584 040; the quantities from other countries are smaller.

As to fresh milk, France is almost alone in sending shipments to England.

Out of a total of 1 969 cwt. imported in 1910, France furnished 1 531. The same applies to cream, 10 219 cwt. out of a total of 11 197 (1).

Control of Butter for Export in Sweden. (British diplomatic Report) — *The Board of Trade Journal*, No. 762. P. 40. London, July 6, 1911. 2801

All vessels containing butter for export from Sweden, must have a mark of a permanent character on the outside, stating whether the butter contains more than 16 per cent. of water or not, and butter marked as not containing more than 16 per cent. of water is to be subject to examination. Sweden

H. M. VILLIERS. (Brit. Consul) **Control of Butter for Exportation from Sweden.** — *The Board of Trade Journal*. Vol. LXXIV. No. 767, p. 292, London, August. 10, 1911. 2802

Mr. H. M. Villiers reports that diplomas of 3 classes are awarded, as the result of three years' testing, to Swedish dairies by the Board whose duty it is to analyse butter made for export. A first class diploma has been awarded to nine dairies, the butter from which during the three years never contained less than 10.5, or more than 16 per cent of water, and never once received criticism either for mould, insufficient pasteurization or leaky packing. The second class diploma has been granted to 28 dairies which attained the same standard as regards water and mould. The third class diploma has been awarded to 118 dairies, which during the three years succeeded in having their products constantly marked with the standard or private mark known to the trade. Sweden

(1) 1 quintal = 1.968 cwt. (*Ed.*).

2803 **Exports of Butter and Frozen Meat from Australia.** (Rap. cons, franc.) *Feuille d'Informations du Ministère de l'Agriculture.* N. 35, pp. 3-4. Paris, 5 Septembre 1911.

Australia

The quantities of butter exported from Australia to the United Kingdom, and the rest of Europe, during the last season, amounted to 1.832.947 cases, of a total weight of 45.023 tons. The figure reached in 1911 is three times greater than that reached in 1908-1909. The progress therefore is very rapid and it may be anticipated that this branch of commerce will develop, because the State of Western Australia, which had previously never appeaed in these statistics, this year came into line. It must also be remarked that Tasmania takes no part in the exportation. As regards the State of New South Wales more particularly, the total of its exports to the entire world amounted to 620.370 cases for the year 1910-1911, being an increase of 180.000 cases over the figure for the preceding season. The United Kingdom and South Africa count, with China and the Sunda islands, among the largest buyers of Australian butter.

2804 **Australian Butter in Italy.** (Die australische Butter in Italien). *Schweizerische Milchzeitung,* 37 Jahrg. No. 73, Schaffhausen, 12 Sept. 1911.

Australia. Italy

The Milan market has already received a large amount of Australian butter, which is likely to have a great effect on prices and endanger the Italian product. At Chiasso the price is 2.70 frcs (2s 3d) the kg.

This butter is very compact and has a minimum percentage of water. It is wrapped in parchment, and packed in cases of 25 kg. (1).

2805 **The Colonial Butter Trade.** (Messrs. Weddel's *Annual Review*). — *Cold Storage,* Vol. XIV, No. 161, pp. 222-224. London, August 17th, 1911.

Great Britain

The seventeenth annual review of imported dairy produce issued by W. Weddel and Co. Ltd. deals with a year (ended June 30, 1911) in several ways remarkable.

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(1) 1 kg. = 2.2046 lbs.

In the first place, the report shows that the advantages enjoyed by the United Kingdom through being able to draw its supplies of dairy produce from sources of production widely spread over the surface of the globe, and possessing varied conditions of climate, have been again made clear. Five different sources of supply of butter and five of cheese failed to send as much as in the previous year.

Four of the countries supplying the largest amounts of butter viz. Australia, Denmark, Russia and Sweden, all sent increased quantities and more than made up for the deficiency. In the case of cheese, although Australia and the United States sent more, the total receipts were rather less than in the previous year. The imports of butter amounted to 222 790 tons, which is an average of 4284 tons a week. The cheese receipts were barely over half those of butter, being only 121 464 tons, or an average of 2336 tons weekly.

The shortage of fodder both in England and on the Continent, will doubless result in a reduction of cows in the milking herds during the coming winter, and naturally in the amount of butter made. In the United States and in Canada too the summer has been exceedingly hot and dry, and the production of butter in both countries is considerably less than last year. The same can be said for cheese ; and the only sources from which increased supplies would seem to be possible next season are New Zealand and Australia.

O. Alleman and Mulle. **The Chemical Action of Rennet in the Manufacture of Emmenthal Cheese.** (Uber den Chemismus der Labwirkung mit besonderer Berücksichtigung der Emmentalerkäsefabrication). — *Milchwirtsch. Zentralbl.*, Heft, 9, 7 Jahrgang. Pp. 385-394. Leipzig, September 1911. **2806**

According to the investigations of Petry, van Herwerden and others, milk casein undergoes splitting up under the action of rennet ; in addition to the formation of paracasein and the albumoses of whey, it gives rise to the formation of substances analogous to paracasein. According to Petry, besides the secondary albumoses, a primary caseose is formed, no longer precipitated by acetic acid, and paracasein is modified in a way making it precipitable by acetic acid, but not by lime, heat or a dilute solution of sulphate of zinc. **Germany**

Van Herwerden designates these substances by the names of Paracasein A, Paracasein B, and Substance C.

The transformafion of paracasein A into paracasein B, and substance C takes place successively, so that finally no paracasein A is

left. When the action of the rennet is more rapid, paracasein A is mainly formed.

These investigations, carried out at the station of Liebsfeld-Bern, were intended to ascertain these conversions during the manufacture of Emmenthal cheese by the methods generally in use. The results of these enquiries are in perfect agreement with the observations of van Herwerden. During a continuance of rennet action for 10, 20, or 30 minutes (calculated theoretically) there was a constant transfer of the quantity of casein formed, which was reduced according to the time the rennet continued to act.

This fact was observed with every description of milk without exception, and with all rennets.

The fact that a greater concentration of rennet (lesser duration of its action) results in a larger quantity of paracasein, throws fresh light on certain processes adopted in the manufacture of Emmenthal cheese.

These laboratory experiments would seem to show that in the production of this cheese the greater yield obtained is due to the lesser time of action of rennet, which leads to a less thorough splitting up of the casein.

Nevertheless, the advantages which are in practice derived from a less prolonged action of rennet are counter-balanced by drawbacks which become manifest during the time of storage of the cheese ; and the writers find themselves unable to advise curtailment of the time of action of rennet generally adopted in the making of Emmenthal.

The writers intend to complete these investigations by studying the methods of manufacturing Emmenthal on the basis of these laboratory data.

2807 C. Besana. **South Italian Cheeses.** (Il Caseificio meridionale ed il suo avvenire). Report presented to the Agricultural Congress of the Abruzzi and Samnium at Campobasso, the 5th September 1910 (1). — *Annuario della R. Stazione sperimentale di Caseificio di Lodi*, Anno 1910, pp. 49-78, Lodi 1911.

Italy

Cheese products in southern Italy are manufactured from ewe, cow, goat, buffalo and mixed milks. The chief of these products are the cheeses " Pecorino ", " Caciocavallo ", and " Provolone ", the " Scamorze ", and the " Manteche ".

(1) See Abs. 2219. *Bull.* for July 1911.

The Roman Pecorino is, according to the writer, the class of ewe cheese most in favour with the public, and is already the staple of a large industry (1).

The " Caciocavallo " is a cow's milk cheese made by a special process called a " pasta filata " (2) characteristic of southern Italy. The same applies to the " Provolone ", the rounded shape of which renders it more suitable as a table cheese, while the " Caciocavallo " being elongated is rather a cheese for grating. Oblong likewise are the " Scamorze ", which are shaped like small " Caciocavalli "; they are salted and consumed locally.

Goat cheese is of no great importance in the cheese industry, nor can it ever be; it is distinguished by a great number of shapes, and the absence of any standard type.

With Buffalo milk, which is much richer than cows' milk, " pasta filata " cheeses are made, which are eaten fresh and much esteemed. These are the " Provature ", " Mozzarelle " etc., but these cheeses can only contribute a very small proportion to the cheese-making industry of southern Italy.

Mixed milk cheeses, supplied mostly by southern Italy, are only of local interest, and are certain to disappear with the improvement of the industry.

As the manufacture of fat cheeses prevails in southern Italy, butter becomes a secondary product of very small importance. It is used for preparing " Manteche ", which are made of butter enclosed in a bag made of a thin layer of " pasta filata " cheese, the butter being whey butter. The introduction of improved methods, however, will lead to the proper production of butter, cream and whey, even in southern Italy; particularly if refrigerating methods are adopted.

G. DE GIRONCOURT. **Touareg Cheese.** — *C. R. Ac. des Sciences*, T. 153, N. 3, pp. 181-194, Paris, 17 Juillet 1911. **2808**

The Touaregs of the Middle Niger, prepare certain cheeses from the milk of their flocks which, owing to their great keeping powers, re a valuable item of barter in the relations of these nomadic peoples with sedentary populations. **Central Nigeria**

(1) See this *Bulletin* for December 1910. pp. 316-317. (*Ed.*).

(2) The curd undergoes an acid fermentation before being shaped as a cheese. When sufficiently fermented the curd is rendered soft and plastic by means of hot water, and is worked by hand till it assumes the desired shape. See C. BESANA *Caseificio, Nuova Enciclopedia agraria italiana*, Disp. 83, 87, 92, 95, 103, 104. Torino 1908.

In the encampments they represent the method of utilising the excess of milk production, the chief basis of food of the Touareg being milk itself.

The conversion into cheese is carried out chiefly in August and September, the time of hunting the young gazelle, the stomach of which is used for rennet. To coagulate the milk the leaf of a tree called " Korouron " is also employed.

The curds are placed in plaited-work drainers ; the mass is then gradually dried, turning it over each day and exposing it, either to the sun for 10 days or to a fire for 6 days only, the cheese obtained by fire exposure being held to be of better quality.

In the making of these cheeses no salt is used, and the milk is not previously skimmed. The size and shape vary according to the tribe. The Timbuctoo Touaregs make a very thin cheese with a mass of curds, not exceeding the width of the hand. The paste, which retains the impress of the draining matting, is finally reduced to a thickness sometimes less than 1 or 2 cm. (0.39 to 0.78 inch). On the contrary the Oudalan Touaregs and especially the Peuls Touaregs, make lens shaped cheeses which attain 15 cm. (6 in.) in width and 8 cm. (3.2 in.) in thickness.

Whatever their shape, these cheeses which are very thoroughly dried, keep very well in the dry condition for many months, and even an entire year.

The analysis of the cheese carried out by M. L. Ammann, with specimens brought back in an excellent condition of keeping, shows a water contents of 8.9 %, total proteids 38.59 %, and butter 36 %. This cheese is therefore extraordinarily dry, it has scarcely begun to ripen and contains no ammonia.

Immersion in water, and boiling in liquid foods restore to the cheese the water lost at the time of manufacture, and bring out the flavour which its hardness at first conceals.

Ripening having merely begun, the nutritive substances remain in the mass, and practically retain their entire value.

This Touareg cheese represents a very interesting product of the Sahelian regions, extending from Mauritania to Lake Tchad. Its manufacture cannot fail to increase very greatly with the growth of prosperity ; it may find an ever-growing market among the sedentary populations of the Niger valley.

R. WINDISCH. **A Casein By-product**. (Untersuchungen über Speisequark *Zeitsch. Untersuch, Nahr. Genussm.* 1911, 21, 613-615). — *The Analyst*, Vol. XXXVI, No. 425, p. 406. London, August, 1911. 2809

Analyses are given showing the composition of a casein or curd product which is obtained in Hungary as a by-product during the preparation of sour cream. After the cream has been allowed to undergo lactic fermentation, the layer of cream is removed, and the remainder of the liquid is heated until the curd has coagulated into lumps. The latter are then collected and subjected to gentle pressure, the resulting product being used as a food. Analyses of 123 samples of the substance yielded the following average results: water, 70.05 per cent.; dry solids, 29.95 per cent.; and ash, 0.70 per cent. The quantity of fat present varied from 0.42 to 15.55 per cent. More than one-half of the samples contained less than 20 per cent. of fat, calculated on the dry substance, the lowest fat-content of the dry substance being 1.50 per cent., and, the highest 42.80 per cent. Hungary

The Netherlands Margarine Industry. — *Journal of the Royal Society of Arts*, Vol. LIX, No. 3064, p. 926. London, August 11, 1911. 2810

Holland is among the leading European countries producing dairy articles, on account of its excellent natural butter ; but its production of margarine is also the greatest in Europe, and was of importance before any other country had begun to manufacture this substance. In 1871, two years after Megè-Mouries had made his discovery, a Dutch firm bought his secret and established at Oss, in Brabant, the first manufactory of margarine in the world. When the secret shortly after became known to the public, a large number of margarine manufactories came into existence all over the Netherlands , principally in places where many cattle were found, so that a large quantity of milk could easily be bought (1). There are in the Netherlands a score of margarine manufactories, employing about 1900 workpeople. Of these, 3 are in Rotterdam, employing 900 hands Netherlands

(1) This food-stuff is usually prepared by mixing 50 kg. of oleomargarine with 25 kg. of milk and 25 kg. of water containing the soluble parts of 100 gr. of the cow's mammary glands. Aromatic and colouring substances are then added. V. VILLAVECCHIA, *Dizionario di Merceologia*: p. 453. Genova, 1911.

1 kg. = 2.2046 lbs. 1 gram. = 15.4323 grains Troy. (Ed.)

Dutch enterprise also controls large margarine manufactories in foreign countries, among other places at Antwerp, Brussels, Hamburg and Cleves. The Dutch law prevents as much as possible margarine being sold under the name of natural butter. The development of the Dutch margarine industry has created an important trade, not only in the product itself, but in all the materials necessary for its production. The trade in margarine and neutral lard is concentrated at Rotterdam, as the majority of the margarine manufactories are concentrated in the southern part of the country,

2811 G. MANGINI. **Value of Buffalo Beef.** (Sull'allevamento dei bufalini e sul valore nutritivo della loro carne in confronto con quella dei bovini). — *Atti R. Acc. Lincei. Rendiconti,* Vol. XX, Fasc. 1, pp. 40-46. Roma, Luglio, 1911.

In a study on the nutritive value of buffalo-beef, the writer comes to the following conclusions:

Italy

1) Buffalo-breeding should be developed as rapidly as possible in suitable districts, especially in Latium, where the dearness of meat is a serious matter for the people.

2) The nutritive value of buffalo-beef is greater than that of ordinary beef, as it contains more albuminoids, nuclein (which is highly phosphatic), and muscular pigments (which indicate high iron content).

3) The muscle-fibres of buffaloes are generally thicker than those of oxen at all ages. The number of muscle-nuclei is also always much larger: this is of importance, as it increases the phosphorus-content of the meat.

2812 LAIDLAW (Brit. Cons.). **Meat Packing in Portland.** *Diplomatic and Consular Reports. United States,* No. 4748; p. 20. London, July, 1911.

United States

Meat packing is a large and increasing industry and Portland is becoming the centre of the trade in the north-west. There are large packing houses at Tacoma and Seattle also. According to reports of the Portland Union stock yards, the figures during the year ending Sept. 30, 1910, were as follows:

	Number	Exported
Cattle	90 735	44 704
Calves	8 162	5 053
Swine	95 670	63 521
Sheep	153 971	80 064
Horses and mules	1 911	1 353

The following are average prices of all classes, live weight, per 100 lbs : —

	January				December			
	Dollars	£	s.	d.	Dollars	£	s.	d.
Cattle	4.00	0	16	8	4.80	1	0	0
Swine	7.80	1	12	4	8.55	1	15	7
Sheep	5.05	1	1	0	4.25	0	17	8

The great packing house of « The Union Meat Company » was in steady work throughout the year. It is situated at Kenton, a suburb of Portland, adjoining the stock yards. Another of the large packing firms of Chicago, at present doing business in Portland, on a smaller scale, contemplates building a large establishment in the same vicinity.

HALL HALL (Brit. Cons). **New Meat Packing Works in Uruguay.** — *The Board of Trade Journal*, N. 762, p. 43, London, July 6, 1911. **2813**

The agents of a Company have lately purchased for £42 500 (200 000 *pesos*) a meat slaughtering establishment in the neighbourhood of Montevideo, and property adjoining with an area of 250 acres (101 15 hectares). The company intend to instal a plant of the most modern character for the freezing and canning of meat, and are prepared to expend about £320 000 (1 500 000 *pesos*) on the business. **Uruguay**

It is calculated that the works will be capable of dealing with as many as 200 000 head of cattle a year, as well as sheep. The following is an estimate of the annual capacity of Uruguay for the production of sheep and cattle :

Sheep	500 000—600 000
Steers for freezing 1100 lbs and upwards . . .	100 000
Steers for freezing, 990—1100 lbs.	50 000
Cattle for tinning (bull meat)	150 000

The action of the Company may lead to the abandonment of the proposed state-aided meat packing establishments (1).

(1) From Fray Bentos in 1907 there were shipped about 15 000 tons of animal products valued at 2 156 000 dollars, about 112 500 head of cattle having been slaughtered in the year. (4.7 dollars, or silver *pesos* = £1). See *Statesman's Year Book for 1911*, p. 1316.

2814 **Refrigerated Meat in Brazil.** — *L'Agriculture commerciale.* VIIIe Année, N. 15, P. 400. Paris, 13 Août, 1911.

Brazil

The Minister of Agriculture of Brazil has signed a decree regarding the installation of refrigerating and chilling machinery and appliances and model slaughter-houses.

This department will include centre entrepots in Rio de Janeiro, and in the principal sea-ports of the States through which the products will be exported. Refrigerators will be erected at the centres of production. Land transport will be organised by means of refrigerator wagons., sea transport by special steamers, fitted with cold storage chambers, model slaughter-houses will be equipped with refrigerators, and bacteriological laboratories will be established in the interior of the States of Minas, Saõ-Paulo and Rio de Janeiro, and at points in north and south Brazil.

2815 **The Refrigerated Meat Industry in Argentina.** — *L'Agriculture commerciale.* VIIIe Année, No II, P. 400. Paris, 13 Août, 1911.

Argentina

Since its creation, the refrigerating industry, the first trials of which date back to 1876-77, has assumed very great importance in this country, and has greatly contributed to the immense expansion of cattle breeding.

In 1890 Argentina exported scarcely 663 tons of frozen beef and 20 414 of mutton ; while in 1909 these figures amounted to 209 435 tons of frozen meat, 1 222 tons of chilled beef, and 66 495 tons of frozen mutton.

The number of refrigerating establishments now amount to 8 for the province of Buenos Ayres, representing a capital of about 31 136 673 dollars (dollar, about 4s.).

The total annual production of these establishments at the time of the census, represented a value of 96 635 873 dollars, being an increase of 213 % on the capital invested.

The value of native products treated amounts to 82 392 974 dollars ; and that of foreign products 248 406 dollars.

As regards the motive power used, it is 12 424 H. P.; and the number of workmen employed is 5817.

Importation into Italy of Argentine Frozen Meat. — *Boll. del Ministero di Agric. Ind. e Comm.*, Vol. II, fasc. No. 6, Serie B, pp. 197-202. Roma, 15 Settembre 1911. 2816

Among the industries which have recently acquired great importance in Argentina, the cold storage of meat deserves special mention. Its produce has established itself firmly on the great English market where, in 1910, no less than 318 775 tons of Argentine meat were consumed. Italy Argentina

The factories can be considered models of their kind, and compete very closely with those of North America.

In 1910 Italy imported 1168 tons of beef and 41 tons of mutton. In 1911 these imports quadrupled. The exportation of live cattle from Argentina into Italy was not attended with good results. Beef in Argentina reached the price of 61 centimes per kilo, (abont 2 3/4 *d* per lb.) f. o. b.

The trade in frozen meat is sure to become very prosperous, provided the cold storage arrangements on board ship be improved and freights lowered.

High Price of Meat in France and Importation of Cold Stored Meat. *La Revue Générale du Froid*, 3e Année, No. 27, Pp. 366-409. Paris, Août 1911. 2817

There is no doubt that the causes of the rise in price of meat are complex, but some are of a general character, and are perhaps consequent upon bad organisation of production, sale and consumption ; others are of a private nature and lie rather with the people and above all the middlemen, so numerous in the meat trade, who take their share of profit and victimise both producers and consumers, either directly or by preventing the adoption of well known improvements long since suggested by common sense. France

The General Syndicate of French Butchers having taken the initiative of calling a meeting to examine into the causes of the high price of meat and the remedies by which it may be dealt with, 2000 persons attended at this meeting and adopted the following resolution:

That the Debussy law (1) be repealed, and that the previous customs tariffs (those of 1892) be re-enforced.

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(1) A law placing prohibitive duties on foreign animals imported into France.

That the regulations regarding cutting up of killed animals and the adhesion of the thoracic viscera be abolished.

That regulations be issued for abolishing the "regrat" (1) and all the unlawful and unfair manipulations likely to increase the prices unnecessarily.

Finally that measures be taken to promote the importation of colonial cattle, and that these cattle be exempted from all customs duty.

These resolutions were submitted to the General Council of the Seine, which, after having discussed at length the question of the high price of meat, at its two meetings on the 21st. and 28th. June 1911, adopted the following resolutions:

That the executive of the General Council communicate immediately with the Minister of Agriculture with a view to discussing the most appropriate means for allaying the food crisis forthwith.

The General Council expresses its wish that Parliament and the Government should study the most suitable means for the increase of national herds and flocks, and for remedying any deficiencies, by the temporary importation of live animals from French colonies.

Finally a resolution was sent to the Executive for submission to the Ministry, to the effect that Parliament should consider a reduction of import duty on chilled and frozen meat, in such a way that while complying with the requirements of the food supply of Paris, this reduction should not threaten French cattle breeding.

All these resolutions form the conclusion of a discussion reproduced *in extenso* in this number of the *Revue Générale du Froid*. The discussion gave various speakers the opportunity of supplying interesting information as to the production of, and trade in meat, and on the advantages and disadvantages which the encouragement of the trade in chilled and frozen meat would involve.

2818 **The Exportation of Frozen Meat in New South Wales.** — *Feuille d'informations du Ministère de l'Agriculture*, XVIe Année, No. 32, p. 4. Paris, 15 Août 1911.

The following tables give the figures for the exports of frozen meat from the port of Sydney alone, during the 11 months from the 1st July 1910, to 1st June 1911, with those for the corresponding period of the previous year:

Australia: N. S. Wales

(1) An unlawful practice consisting in "cornering" commodities, which are afterwards sold at secondhand at an increased price. (*Ed.*).

Mutton exported (number of carcases).

	1910-1911	1909-1910
United Kingdom and Continent	1 465 056	1 442 095
South Africa	68 335	35 623
Canada	40 672	14 917
Port Said	4 749	4 500
Philippines	8 588	7 475
Malta	11 709	14 001
India and Ceylon	4 683	3 825
Singapore and Java	3 193	375
Hong-Kong	7 211	7 076
Hawai	1 937	4 089
Japan	251	2
Gibraltar	—	1 142
Other countries	2 034	1 000
Total	1 617 418	1 536 120

Beef exported (in quarters).

	1910-1911	1909-1910
United Kingdom and Continent	27 577	18 560
Philippines	2 185	1 868
British New Guinea	—	3
Port Said	244	329
Singapore, Java, etc.	758	316
Hong-Kong	55	—
South Africa	10 231	—
Hawai	237	—
India and Ceylon	10	166
Japan	224	—
Total	41 521	21 242

2819

H. V. JACKSON. **Exports and Cold Storage. Rabbits and Hares exported from New South Wales.** — *Agricultural Gazette of New South Wales*, Vol. XXII, Part 6; Sydney, June 2, 1911, pp. 526-532.

It is estimated that the quantities of rabbits and hares packed and frozen in New South Wales during the year ending Dec. 31, 1910 were the following :

Rabbits : 631 843 crates
equal to 15 164 232 single rabbitis.
Hares : 1828 crates
equal to 21 936 single hares.

Australia : N. S. Wales

The quantity of rabbits and hares exported were 8 007 068 pairs valued at £406 762, being an increase of 834 918 pairs, valued at £77 742, over the exports for 1909.

The rabbit and hare skins exported amounted to 5 650 400 lbs., value £329 616; showing an increase on the previous year in value of £169 244. The value of rabbits and hares frozen and of rabbit and hare skins exported totalled £736 378.

There are twenty freezing works dealing with rabbits in the country at the present time, and it is understood that three new works are contemplated.

2820 **Consumption of Meat in Switzerland.** — *Feuille d'Informations du Ministère de l'Agriculture.* XIe Année, No. 32, Pp. 3. Paris, 15 Août 1911.

Switzerland

The Federal Council has just published the report of slaughter house supervision and the inspection of and trade in meat during the year 1910. It is the first time a report of this kind has appeared. The Federal law on food commodities compelled the cantons to create the necessary officers and organization for this supervision and inspection work, where they did not exist, and from the beginning of 1910 they were in operation in all cantons except Tessin, which only issued the necessary orders at the beginning of 1911.

The total amount of animals slaughtered in Switzerland for 1910 exclusive of Tessin is indicated in the following table:

Bulls	27,200
Oxen	66,631
Cows	96,112
Heifers	34,937
Calves	319,867
Sheep	146,134
Goats	24,896
Pigs	456,374
Horses	111,546
Total	1,183,697

The ratio between the number of oxen and cows slaughtered varies greatly according to the canton. Oxen predominated in the following cantons: Zurich, Glarus, Schaffhausen, Basel City, Graubünden (Grisous), Neuchâtel, Vaud and especially Geneva, where there were slaughtered only 1093 cows as against 7009 oxen. All the other cantons show a difference in favour of the cows, particularly

the canton of Berne, where only 4236 oxen were killed as compared with 21 398 cows; that of Fribourg with 469 oxen as against 3743 cows; and lastly the cantons of central Switzerland where the slaughter of an ox is often a rare thing.

As to the total consumption of meat, including imported meat, it amounts to 150 million kilogrammes, which represents a little more than 100 grammes per day per head of the population.

For each native ox slaughtered in Switzerland, twelve were imported, so that the imports exceed 40,000 oxen per year, which represents a total weight of 14 343 000 kilogrammes. To this must be added 86 000 pigs, 10 000 bulls, 28 000 calves, etc. To sum up, the Federation obtains from abroad altogether 29 million kilogrammes of meat, while native cattle supplies 103 millions, being a proportion of 22 % of meat of foreign origin, which rises to 25 %, taking into account imported meat and meat preparations.

In 1910 three million kilogrammes of horse flesh were consumed. Horse flesh is in greater demand than mutton of which only 2 300 000 kilogrammes were eaten.

The Turkish Wool Industry. — *Journal of the Royal Society of Arts*, Vol. LIX, No. 3064, p. 926. London, August 11, 1911. **2821**

The provinces of Adana and Angora, in Asiatic Turkey, are known for their fine breed of sheep, which annually yield large quantities of excellent wool suitable for the manufacture of carpets.

Ottoman Empire: Turkey in Asia

The Adana wool is coarser than that of Angora, which is very fine. The former is preferred in the American market, because it is much longer. Thus, of the 250 tons of wool produced in the Province of Adana in 1910, about 160 tons were exported to the United States, 40 tons to France and the balance was retained for use in Turkey. The entire yield of wool of the province of Angora is over 1 000 tons per annum, most of which goes over the Anatolian and Bagdad Railway to Constantinople, and is thence exported. About 150 tons, however, are brought by camel to Mersina and shipped to Germany, France and Austria. With the completion of the new sections of the Bagdad Railway, now under construction, a much larger part will come to Mersina, which will then become an important wool market.

2822 **The Production of Wool in New Zealand and South Africa.** — *Livestock Journal*, No. 1952 ; p. 232. London, September 1st, 1911.

N. Zealand. South Africa

The production of wool in New Zealand has increased in a greater ratio than meat, the average weight per fleece having risen, though this is in some measure due to the presence of a greater quantity of earth and other waste in the fleece of sheep kept on cultivated land. This tendency will be more marked as cultivation extends. The quality of the clip has deteriorated through the inter-crossing of the many breeds, and want of care in the classing of the farmers' breeding flocks, many of which are of a nondescript character. Wool has, in fact, been a secondary consideration to the majority of small farmers (1).

The export of South African wool has risen from 234 000 bales in 1902 to 377 000 in 1910, and it is needless to say that in the last few years there have been evidences of steady, if slow, improvement in the general character of their wools. During the ten years 1896-1905 some 1640 breeding sheep were imported into Cape Colony chiefly from the United Kingdom, Germany, France and the United States. South Africa has been, and is still, importing frozen mutton to supplement the domestic supplies, but this condition of affairs cannot continue, especially under the new Union.

2823 BARRET. **Australian and Cape of Good Hope Wool.** — *L'Agriculture Commerciale*, No. 10, p. 246; Paris, 28 Mai 1911.

Australia. S. African Union: Cape Colony

Australian wools are finer and softer than African and are therefore held in greater esteem. (2).

The sheep of Australia are the descendants of thirty thoroughbred merinos selected from the finest Spanish flocks. At the present time importations are made every year, and on the original stock the most famous strains of Europe have since been grafted.

In Africa the type is not so pure; it descends from English merinos crossed with South African ewes. Besides the general hygienic conditions are less favourable in Africa than in Australia.

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(1) See: *How Wool is Prepared for Market in Great Britain. The Science and Pratice of Farming during 1910 in Great Britain :* p. 503. International Institute of Agriculture, Rome, 1910. (*Ed.*).

(2) Cf. this *Bulletin* for May 1911. Abstract 1474. (*Ed.*)

The Cape, in continuous land connection with the hot countries of the Equator, is deficient in water in many places; it is covered with fine sand which is conveyed by the wind, soiling the fleece and making the wool rough and brittle. Australian wools of the same fineness of quality fetch 10, 12 and 15 % more than Cape wool.

The animals degenerate in both countries, and there is generally the need to have recourse to new blood frequently in order to renew the stock.

W. Bateson. **The Wool of Merino Sheep and the Problems of Selection.** — See above, Abstr. 2458. 2824

Wool Imports in the United Kingdom during 1910. — *Journal of the Royal Society of Arts*, Vol. LIX, No. 3066, p. 954. London, August 25, 1910. 2825

The total quantity of sheep, lamb, and alpaca wool imported in the United Kingdom in 1910 was 803 000 000 lbs,, or only 5 000 000 lbs., less than in the previons year, when the imports were the highest on record. Re-exports amounted to 335 000 000 lbs., leaving 468 000 000 lbs., as the net amount retained for consumption, an increase of 50 000 000 lbs., over the net imports of 1909, and of 17 000 000 lbs. over the net imports of 1907. The year 1910 therefore created a new record in this respect. The proportion of total imports from British possessions was 83 per cent., about the same as the previons year. The supplies from South Africa and India were somewhat smaller, but Australia and New Zealand shipped larger quantities, the latter country thus surpassing the record made in 1909. Most European countries sent smaller supplies, but France and Germany were exceptions. Imports from Argentina and Uruguay fell from 47 millions to 36 milion lbs., but those from other parts of South America increased (1). **Great Britain and Ireland**

(1) Cf. *The Science and Practice of Farming during 1910 in Great Britain*, p. 504. International Institute of Agriculture; Rome, 1910. For the world's wool production and consumption, see this *Bulletin:* Feb. 1911, Abstr. 541 [Ed.].

2826 **Horse-hair Market.** — *The Board of Trade Journal*, vol. LXXIV, No. 766, p. 238, London, August, 1911.

S. America. Russia

The following is extracted from the *Frankfurter Zeitung* of 20th July. In few industries has the price of raw material increased so much as in the horse-hair industry. The main reason for this is the decline in horse breeding in South America, which was formerly the largest producer, inasmuch as farmers find it more profitable either to rear cattle or to bring the grazing land under cultivation. Further reasons are: the increasing tendency to dispense with horses all over the world by adopting machinery for agricultural purposes, and the use of railways for transport. In this latter connection, for instance, the Trans-Siberian Railway has had a marked effect on horse breeding in Russia owing to the abandonment of many caravan routes. It is to be noted that, concurrently with the rise in the price of horse-hair, the quality tends to become worse, owing to the inclination on the part of dealers to mix the better hair with hair of a poorer grade.

2827 De Goutcharoff. **The Work of the Imperial Russian Society for Aviculture.** (L'Opera della Imperiale Società Russa di avicoltura rurale). — *Descrizione sommaria delle razze esposte dalla Russia all'Esposizione d'avicultura internazionale di Torino*, in 4°, pp. 16.

Russia

The Imperial Russian Society for Aviculture consists in a central body and several branches. The former, which includes the Board of Directors, has its head-quarters at Moscow ; and the fifty branches are spread over the country at Ekaterinoslaw, St. Petersburg, Wiatka, Riasan, Sepukow, Ekaterinburg, Iaroslaw, Tiflis, Pensa, Nijni Novgorod, Tula, Riga, Lodz, Orenburg, Oufa, Perm, Novotcherkask, Charkov, Irkoutzk, Omsk (Siberia), Ekaterinodar, etc. The purpose of the Society is the encouragement and development of rural aviculture both from a technical and a commercial point of view. The Society publishes a review (Rural Aviculture) and has a museum of aviculture. Since its foundation, in 1896, it has organized 300 poultry shows.

2828 F. E. Green. **Cooperative Poultry Keeping.** — *Agr. Economist and Hort. Review*. London, August, 1911.

Great Britain: England

The Street Cooperative Poultry Depôt is an object lesson to all poultry keepers. It shows that poultry keeping as a side line

can be organized into a large paying industry even in most unfavourable districts when it is cooperatively managed. Moreover it shows how a large cooperative depot can grow out of small beginnings. The share capital stood at the beginning at only £ 44.12 *s.* 10 *d.*, and even with a large turnover today the capital stands only at £ 534 17*s.* 6*d.* No individual member is required to pay down more than 7 *d.* for the india rubber stamp for marking his eggs, 2 *s.* for entrance fee and 5 *s.* for one share. Because the industry has been intelligently managed the depôt is now able to pay a higher price for eggs and birds to its members than before.

The chief factor making for economic success lies in the contracts which small poultry keepers are able to make collectively with large dairy companies. It preserves too, a large number of eggs in tanks capable of holding 7 000 eggs.

But besides cooperative collection and distribution, it hatches in its large incubating room a great number of birds which it rears for fattening. Every egg before it leaves the depôt is tested by the lamp; those not passing muster are either marketed as seconds or returned to the senders.

C. H. Schultz. **The Parasites of Poultry.** — See above, Abstr. 2754 **2829**

The "Ancona" Fowls. (Die Ancona-Hühner. Der Ländliche Normal Hühnerhof.). — *Nutzgeflügelzucht*: 13 Jahrg. No. 38; pp. 338-339. Gross-Lichterfelde: 17 Sept. 1911. **2830**

The "Ancona" fowls are almost unknown in Germany, although they probably lay the best eggs in the world. Coming from the Marches, the capital of which is Ancona, they are regarded as the best fowls in Italy both as regards eggs and meat. **Italy**

As the temperature in the Marches varies from several degrees of frost in winter to 44° C. (1) in summer, the Ancona breed is very hardy, and easily adapts itself to different climates.

It was introduced into England in 1848, and into America in 1890.

An Ancona cock weighs 5 ½ lbs.; a young cock and an old hen 4 ½ lbs. They are handsome birds and have black feathers spotted with white. The hens begin to lay from their eighteenth week.

(1) Or 111. 2° Fahr. (*Ed.*).

This breed eats relatively very little ; the food required for three American or Asiatic fowls is sufficient for five Anconas. A hen may lay as many as 232 eggs a year, and 270 eggs have been obtained by means of trap nests (1).

2831 **Gros beaks and their Importance in Agriculture.** — See below, Abstr. 3035.

2832 **Insectivorous Birds in New South Wales.** — See below, Abstr. 3035.

2833 **Egg Laying Competitions in Australia.** — *The Journal of the Board of Agriculture.* No. 4; pp, 319-321. London, July, 1911,

Laying competitions have been carried on for a number of years under Government supervision in each of the six States of Australia.

Australia

They afford evidence of the average yield of well-bred birds, aud indirectly of the "profit" or surplus receipts from the sale of eggs over the cost of food.

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(1) The Ancona variety first appeared in England in the early fifties. At that time the birds presented a very mongrel appearance. In Italy, whence it was imported, there are different varieties or sub-varieties besides the one most commonly known, *viz.*, the black and white, all of the same type, but variously coloured, some white, others brown and red.

Little appears to have been known about the Ancona in Eugland before the latter part of the last century. Doubtless the blrds were kept by many for their unequalled laying qualities, but it was rare to see them on the show bench.

The true Ancona is one of the most prolific layers extant. The one aim of an Ancona's life appears to be egg production. One item, which is an important factor to all who keep fowls for utility purposes, is that they require no forcing food to induce them to lay in nutumn and winter.

Anconas at any age require much less food than any other variety of fowl, and no greater mistake (from a profitable point of view) can be made than letting them have corn or soft food, *ad lib.*, unless, of course, they are kept in close confinement. It is estimated that a Minorca will consume about double the amount of food picked up by an Ancona, and a Minorcaized Ancona will eat nearly, if not quite, as much as a pure Minorca — in fact, they are the same size and type — and this is just one of the many disadvantages of the crossing. As a table fowl tlie Ancona has few qualifications. J. T. BROWN. *The Encyclopedia of Poultry.* Vol. I. London, p. 21-22. (*Ed.*).

As an example of this, the following table may be given, showing the results of some of the twelve months competitions in the different States: (1)

State	No of birds	No of eggs laid	Average no of eggs per hen	Cost of food per hen s. d	Net Profit per hen s. d.
New South Wales . . .	360	63 318	177	7. 0	10. 2
Queensland	168	30 543	181	4. 8½	10. 1½
South Australia	450	80 959	179	5. 4	6. 4
» »	678	126 133	186	6. 6	8. 4
Tasmania	168	27 106	161	6. 9	9. 2½
Western Australia . . .	288	50 788	176	6. 8	13. 3

The average production over all these competitions was about 175 eggs annually, which, considering the number of birds entered, is a very high figure. The winning pens, comprising 6 birds each, accounted for very much larger numbers, the figures in four competitions being 232, 222, 255, and 254 per hen. In fact, it is stated that for breeding purposes, very little value is attached to a bird whose score falls under the 200 standard. From 220 to 240 the birds are considered useful, while when yielding above this number they become valuable. Individual scores of 270 and 280 are not unknown.

These egg competitions are a distinctive feature of Australian poultry keeping, and they have exercised a great influence on its development, particularly by fostering the commercial or utility aspect of the industry in preference to the production of exhibition stock (2).

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(1) This table shows that the cost of food per hen varied from 7*s* to 5*s* 4*d*; while the net profit per hen varied from 13*s* 3*d* to 6*s* 4*d*. (*Ed.*).

(2) There are not many data available on the average numbers of eggs laid by poultry, whence the necessity of these egg laying competitions in all countries.

In Italy, G. TREVISANI *Pollicoltura*, Milano, 1892) calculates 90 eggs per hen per year as an average; G. SOMADOSSI (Pollicoltura, Trento, 1907, p. 19) estimates the number of eggs laid per year by a well kept hen at 180 to 200. See also ITALO GIGLIOLI, *Malessere agrario ed alimentare in Italia*, Portici, 1903. p. 681.

In France according to Trevisani (*o. c.*) the average is 150 eggs, and in Austria in ordinary farms it is not above 100 eggs, whilst scientific poultry keeping raises this figure to 150 (G. W. Welche Erträge Können die Landwirte Oberösterreichs aus der Geflügelzucht ziehen? *Landw. Zeitschr f. Oberöster.* Linz).

In Germany the following figures are given as the average production of the differents breeds represented at shows:

Rheinländer 104.7 eggs; Wyandottes 130.7; Minorcas 126.5; Italians 121; Yellow Orpingtons 111.3 (*Nutzgeflügelzucht*, p. 387, Gross Lichterfelde, 15 Oktober 1911).

In Belgium the average is estimated at 150 eggs (E. BROWN. *Report on*

2834 **The Preservation of Eggs.** — *La Nature*, 39e année, N. 1094, p. 170. Paris, 12 Août 1911.

The keeping in good condition of eggs is a problem of the utmost importance from both the economic and hygienic point of view. Egg are a high class food consumed to an enormous extent. In France the average consumption is 500 million kilogrammes of eggs per year, 300 millions of which are produced in France and 200 millions imported.

France

The production of eggs is not uniform throughout the year; therefore, preserving in some way is an absolute necessity; from this, however, very serious miscalculations and disagreeable surprises sometimes result. Preserved eggs have been accused of being the cause of more or less grave cases of poisoning.

Dr. Miramond de la Roquette has just read at the Congress in Dijon a remarkable paper in which he examines the different causes of deterioration of eggs. Starting from this question, he enters upon a critical study of the methods of preserving. The essential points of this study are the following:

Generally, when an egg grows stale under normal conditions, the essential change is dehydration which is manifested by an average loss of weight in the open air of 10 to 15 centigrammes per day. This loss of weight varies with the thickness of the shell and the outside conditions of temperature and moisture. This progressive drying is the prime cause of the change in taste and other alterations of the egg. An egg which has lost by evaporation $^1/_{10}$ of its weight, can no longer be eaten soft boiled; after losing $^1/_5$ it is really bad and unfit for use. This growing stale is attended by chemical alterations which are still far from well understood.

Alterations of the egg by putrefaction or mouldiness are relatively rare, 7 to 8 % only. They are in most cases due to germs which have made their way through the shell and first settled on the membranes. When laid, the inside of the egg is practically aseptic.

To preserve eggs therefore, the following must be the objects aimed at: avoiding contact with the air and contamination, preventing evaporation and eliminating external causes of infection.

Preservation in lime water is in France the method widely used

the Poultry Industry in Belgium, p. 38. London 1911); in Denmark it is 130 to 150 eggs (E. BROWN. Report on the Poultry Industry in Denmark and Sweden, p. 37. London, 1908). C. S. VALENTINE. *How to Keep Hens for Profit*, New York, 1911, gives the average as 197 eggs for Wyandottes in New England, 198 for Barred Rocks, in Pennsylavia, and upwards of 200 eggs for Plymouth Rocks, etc. (*Ed.*).

in industry and in households ; on the whole this method seems to be the most satisfactory. A good solution is made by 8 to 10 % of quicklime, or 20 % of slaked lime. This liquid is an energetic antiseptic, without being poisonous ; it hardly penetrates the substance of the egg at all, and imparts no injurious property. The egg retains its complete weight and the greater part of its natural properties for a considerable period, 10 months at least.

Of course the eggs must be subjected to the treatment when very fresh ; they must be entirely immersed and kept in a cold place away from the light.

R. Berger. **The Preservation of Eggs.** — *The Journal of Industrial and Engineering Chemistry*, Vol. 3, No. 7, pp. 493-495. Easton, Pa., July, 1911. 2835

While the preservation of eggs on a commercial scale by the cold storage system is universally adopted, this method is not very suitable for the consumer or small producer. To meet the needs of the latter many experiments have been made to discover a method by which the best results might be obtained, and as a result the conclusion has been reached that immersion of freshly laid eggs in silicate of soda solution is the most efficient. United States

Mr. Berger gives the following directions for preserving eggs in silicate of soda :

1. Use clean receptacles of glass, earthenware, wood or of almost any material, provided it be paraffined inside and can be sealed hermetically. Half-gallon (2.27 lit.) screw cap glass jars, which will hold 14 or 15 eggs, are satisfactory and advisable.

2. Common silicate of soda of 40° Bé. or over, gives good results. It should be kept well sealed by paraffined or vaselined paper, pasteboard or cork stopper, or other cover impermeable to air and moisture, to prevent it from gelatinizing. Glass stoppered bottles should not be used, as a little silicate may find its way to the ground neck, and it will then be impossible to remove the stopper later on, as silicate of soda will cement the stopper to the neck of the bottle.

3. The water should be pure, boiled water being preferable.

4. One part of silicate of soda to be very thoroughly mixed with 10 to 15 parts water, or 1 part powered silicate dissolved in 30 parts water, the solution to be well cooled before immersing the eggs.

5. The eggs must be clean, with strong, sound shell. They should be put into the preserving fluid, if possible, the same day they are laid, especially in summer. Unfertilised eggs are not

likely to spoil, even if they are not so fresh. But it is one of the advantages of this method that fertilized eggs will keep perfectly well, if the above precautions are taken.

6. As soon as the eggs are packed in the preserving liquid, the receptacle is to be carefully sealed with a paraffined or vase-lined paper or pasteboard, or with a screw cap or other reliable and tight cover. This is necessary not only to prevent the water from evaporating, which would expose the upper eggs to the atmosphere, but also to prevent the carbonic acid of the air from decomposing the silicate.

7. The eggs packed in the well sealed jars should be stored in a cool place, especially at first, that is, before the egg germs have ost their vitality. But the temperature must not drop below the freezing point.

2836 H. W. HOUGHTON. **The Effect of Low Temperatures on Ground Chicken Meat.** — *The Journal of Industrial and Engineering Chemistry*, Vol. 3, No. 7, pp. 497-505. Easton, Pa., July, 1911.

United States

The writer has investigated the action of low temperatures on the ground meat of 36 carefully selected and milk-fed Plymouth Rock chickens.

From these investigations the following general conclusions are obtained:

1. Chicken meat subjected to cold storage, for a period of five months, showed certain physical and chemical changes which clearly demonstrated that it was not identical with fresh material.

2. The cold storage meat felt soft in marked contrast to the firmness of the fresh chicken meat, and a slight charateristic odour was detected,

3. The chemical changes that apparently take place in the cold-stored meat by direct comparison with the original chicken meat are: *a*) slight variations of moisture and ether extract; *b*) a small increase of ammonia, especially in the case of light chicken meat; *c*) a decided increase of water-soluble nitrogen, of total solids, and organic extractive matter in the light chicken meat with a slight decrease of the same constituents in the dark meat; *d*) a decrease of coagulable nitrogen in both varieties of chicken meat during the first thirty days, followed by a rise which did not reach that of the fresh sample; *e*) an increase of amino acids in both kinds of chicken meat with an increase and decrease of the proteoses and peptones respectively in the light and dark chicken meat; *f*) an increase of soluble phosphorus was indicated during the first 90 days

of the storage period, which was more marked in the dark meat than in the light meat; *g*) in the cold-stored samples a little volatile sulphur was found, none being detected in the fresh meat; *h*) the analyses of chicken fat indicated a fairly constant composition, but in the chicken meat fat of the cold-stored chicken the iodine index, increased regularly while the index of refraction decreased slightly.

4. The alteration particularly noticed in the light meat was prevented to a certain extent by storing in an atmosphere of carbon dioxide, thus increasing the production of proteoses, peptones, and amino acids. The initial increased production of these nitrogen bodies is probably due to enzymic action during the first 30 days at 12° C. The enzymes detected were peroxydase, catalase, protase similar to trypsin, invertase, and a nitrate reducing enzyme.

An exhaustive bibliography is appended.

W. Bateson. **Ostrich Feathers and the Problems of Selection.** — See above, Abstr. 2458. 2837

Grangeon. **The Landibe, *Borocera Madagascariensis* Producer of Native Silk in Madagascar.** — See above, Abstr. 2715. 2838

E. Quajat and P. Tomaselli. **The Effects of Electricity on the Hatching of the Silk-worms' Eggs.** (Azione dell'elettricità durante le singole fasi della vita intraovulare nel bombice del gelso). — *Le Stazioni sperimentali Agrarie Italiane.* Vo. XLIV, Pp. 3-4, P, 218-290. Modena, 1911. 2839

The writers resume the investigations begun as far back as 1873 on the action of electricity on silk-worms' eggs.

For the present experiments 4 different electric machines were used: Italy

1) Holtz, 4 discs of 52 cm. (20.8 inches) diameter;
2) Holtz, 2 discs of 67 cm. (26.8 inches) diameter;
3) Wimshurst, 2 discs of 50 cm. (20 inches) diameter;
4) Topler, 2 discs of 32 cm. (12.8 inches) diameter;

The method of electrifying generally followed, consisted in connecting up the electrode sending out the current, by means of an insulated copper wire with a metal button connected in its turn with a curved metal rod fitted with an ebonite handle; a wooden support kept this button at the required distance from the eggs; the latter were put on a metal plate mounted on an ebonite foot, on which rested the other electrode.

The experiments are stated to have shown that electricity sent through the eggs after complete or incomplete hibernation, or during the preparatory stage :

1st Does not injure the eggs in any way.

2nd That especially in eggs which are not yet completely hibernated it produces a greater amount of hatching than in control eggs.

3rd The hatching of electrified eggs takes place, one, two and sometimes three or even more days before those of the control eggs. The difference is still more pronounced in the native strains, which is explained by the greater number of days of incubation which they require.

It must be observed that at small distances sparks are struck which destroy a part of the eggs if they fall on them several times, while at distances exceeding 2 cm. there is only the electric flow which alone exercises a favourable influence on the eggs.

The writers attribute to the difference in the methods of electrification and also in the machines, the contradictory results obtained in the course of the preceding enquiries, and also of the present enquiries in connection with the prolonged action of electricity on the eggs. If electrified with the Töpler machine at a short distance and say for ten minutes, all the eggs perish, and a short time after electrification their contents have shrunk. While if electrified for the same time, or even a much longer time, with the Holtz and Wimshurst machines, the eggs suffer no injury.

2840 QUAJAT and SAKO. **The Leaves of Morus Alba and Morus Nigra as Food for Silk-Worms.** (Mûrier noir et Mûrier blanc (*Maclura* and *Cudrania*). — *Le Moniteur des Soies.* No. 2555, pp. 4-5, Lyon, 16 Sept. 1911.

Italy

The writers have proved that silk-worms reared on the leaves of the white mulberry (*Morus alba*) produce heavier cocoons with richer silk than those fed on the leaves of the black mulberry (*Morus nigra*).

While, however, Mr. Quajat finds little difference between the elasticity and the tenacity of the threads of the two kinds of cocoons, he considers that those spun by silk-worms fed on the foliage of the black mulberry are slightly superior; while Mr. Sako holds that the silk of the cocoons from the white mulberry is notably superior in both the above-mentioned qualities. This divergence of opinion shows the importance of repeating the experiments under varying conditions of environment and treatment, in order to arrive, not only

at a just estimate of the relative value of the foods in question, but also to determine the factors which influence the development of the silkworm (1).

The same difference of opinion exists with regard to the value of other leaves, such as *Maclura* and *Cudrania* (2), which have been used as a substitute for *Morus alba* in the rearing of *Bombyx Mori*.

A. Mozziconacci. **Experiments on Infection with Flacherie through Food, and the Means of Preventing its Spread.** — *Le Moniteur des Soies*, No. 2554, pp. 5-2. Lyon, 9 Septembre, 1911. 2841

The author during the season of 1910 carried out a series of enquiries into flacherie infection through the food of worms, by means of mulberry leaves contaminated with dust collected in 1898, that is 12 years beforehand, in a silk worm nursery where flacherie had destroyed the worms. France

First Experiment. — On the 18th. of June 1910 three lots T. L. S. of 20 worms each, of the same origin, which had arrived at maturity, were formed.

Lot T. was given a meal of mulberry leaves sprinkled through a very fine sieve, with the dust collected in 1898.

Lot L. was given a meal of mulberry leaves sprinkled with the same dust, on which, however, there had been previously sprayed a 5 % solution of lysoform.

Lot S. received a meal of mulberry leaves with the same dust, but before giving them to the worms, the leaves were put under a glass bell for 35 minutes and subjected to the action of powerful sericine vapours.

Lysofom is a mixture of formol and soap : sericine is a volatile product composed of several substances of vegetable origin : thymol, eucalyptol etc.

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(1) See: *Ricerche comparative sull'influenza dell'alimentazione con* Morus alba *e* M. nigra *nel Bombice del gelso*. Padova, 1907.

(2) *Macluria Aurantiaca* and *Cudrania triloba*. See: G. Arcangeli, *Alcune osservazioni sull'alimentazione dei bachi da seta*, Atti della R. Accademia dei Georgofili, Vol. XXIV, D. 1., Firenze, 1901. Mr. Arcangeli has also experimented on several other plants. V. *Esperienze effettuate sopra un piccolo allevamento di bachi da seta*. Ibidem, Vol. XXV, D. 2. Firenze, 1902. (*Ed.*).

The results obtained are grouped in the following table :

	Lot T Control	Lot L Lysoform	Lot S Sericine
Worms killed by flacherie . . .	6	3	8
Cocoons destroyed by flacherie .	12	6	6
Finished cocoons, alive	2	11	6
Percentage of dead worms . . .	90	45	70

Second experiment. — On the 22nd. June, ten mature worms were put apart. They were given a meal of mulberry leaves sprinkled with dust gathered in 1898. This dust, however, was previously put under a glass bell for three and a half hours and subjected to the action of an abundant quantity of sericine vapour. This vapour had only a very feeble action on the micro-organisms of flacherie, for there were found four worms killed by flacherie and only three finished cocoons with live chrysalides.

The results of these enquiries for the moment are :

1. That flacherie is contagious ; it is very easily and surely transmitted by the absorption of dust from the nurseries where the disease has existed.

2. That dust kept in a bottle twelve years does not lose its virulent action. It transmits the disease as surely as dust from a place where flacherie is rife.

3. That antiseptic substances prevent the development, in the alimentary canal of the silk-worm, of the ferments and vibrions causing flacherie.

4. The flacherie is indeed, as Pasteur had shown, due to these micro-organisms and not to a debilitated condition of the worm.

5. That lysoform appears to exert a greater destructive power than sericine on the organisms of flacherie and grasserie.

2842 FRANCIS J. G. BELTZER. **Bleaching of Tussor silk.** (Das Bleichen der Tussah-Seiden). — *Chemiker Zeitung*, Jahrg. XXXV, No. 94, Pp. 861-863. Cöthen, 8 August, 1911.

Germany. India. China

The brown or grey colour of Tussor silk produced in India and China by an insect feeding on the leaf of the oak (1) is difficult to get rid of. The writer recommends the following method of bleaching, which can be applied both to skeins and fabrics.

(1) See this *Bull.* for December 1910, p. 321 and Abstract 548 *Bull.* for February 1911. (*Ed.*).

1. *Gum Removing bath.* Dissolve 10 kilogrammes of " Cocos Bensoap " and two or three kilogrammes of perborate of soda in 1000 litres of water at a temperature of 40 to 50° C. The time during which the silk must be steeped in this bath varies with its quality. For fabrics it is longer than for skeins, and is 5 to 6 hours.

2. *Decoloration bath.* — A solution of 6 % to 10 % by volume of hydrogen peroxide in water made alkaline with ammonia, heated to a maximum of 30 to 40° C. Duration of bath about 24 hours. Wash with water, then plunge in a hot solution (70° C.) of oxalic acid and dry. After this treatment, the silk only shows a slight yellowish shade. It becomes pure white after the third and last bath.

3. *Bleaching bath.* — Dissolve 10 kilogrammes of " Blankit " (manufactured by the Badische Anilin und Soda Fabrik, composition not given by the writer, in 1000 litres of water at 30 to 40° C. ; duration of bath 12 to 14 hours.

Silk Worm Breeding in Normandy. — *Bulletin des soies et des soieries*, N. 1792, p. 3. Lyon, 9 Septembre 1911. **2843**

While in the southern Departments of France silk-worm breeding has fallen off, if anything, for some years, this branch of agriculture is gaining ground in the northern Departments. Thus there has been established at Deville-les-Rouen, a syndicate of silk-worm breeders of Normandy, which this year received a silver medal at the Elbeuf Exhibition. **France: Normandy**

Specimens of cocoons of a yellow strain reared this year in Normandy appeared of excellent quality.

Caviglia. **The Production of Silk in Japan and Italy**. (La produzione della seta in Giappone ed in Italia). *Bollettino di Sericoltura*, Pp. 355-356. Milano, 8 Sett. 1911. **2844**

The agricultural population of Japan is rapidly increasing, but the cultivated area does not increase in proportion. The production of silk for exportation has nevertheless grown more considerable. The reason why Japan has been able to increase this production up till now, is that there have always been fresh regions to be won over to silk-worm breeding, but if the increase of production were to lead to a drop in the present price of silk, the consequence to Japan's agriculture would be disastrous. **Japan. Italy.**

Hitherto increasing production is equalled by increasing consumption. Cotton and wool have attained their maximum of production ;

therefore there is a shortage of textile substancees, and the demand for silk should increase.

Italy can only face competition by increasing the output, or reducing the cost. For this purpose the rearing of silk-worms should be extended throughout Italy, mulberry trees distributed free, and silk worm rearing taught in primary schools. Japan has already reached the minimum limit in the price of silk ; these prices are on the other hand still remunerative to the industry in Northern Italy.

Moreover, Italian silk is always most sought after in the world's market.

2845 **Sericulture in the Philippines.** (La sériculture aux Philippines). — *Bull. de Soie et de Soieries*, N. 1794, p. 5, Lyon. 23 Sept. 1911.

The Philippines have been distinguished for some years for the manufacture of materials woven from pine-apple fibre.

Philippines In 1910, raw silk was imported to the value of $ 635 514.

Experiments have proved that silk-worm breeding in the islands would be a paying industry.

The first experiments were made with silk-worms from Ceylon, these have been crossed with a Japanese species, and a pure white cocoon has been obtained.

These hybrids yield nine crops of silk in the year, while only two or three are produced by ordinary Chinese and Japanese silk-worms. Many places in the Philippines are, from the point of view of climate admirably adapted to sericulture, while the fact that the home-markets will, for a long time, take all the silk produced in the archipelago, offers exceptional present advantages to the industry, which has a great future before it.

2846 D. R. Mc. Connel, **The Blossoming of the Eucalyptus and its Influence on the Product of the Honey-bee from a Commercial Standpoint**. — *Queensland Agricultural Journal*, Vol. XXVI, Pt. 3, pp. 130-133. Brisbane, March, 1911.

Australia : Queesland « Perhaps in no part of the world is the native flora characterised by so general and abundant a secretion of honey as in Australia, and at the same time by such a capricious appearance of its blossoms. The honey-gathering insects are comparatively few, and the native apidae are for the most part too insignificant in size to fulfil the function of floral fertilization. (Probably the fertilisation

of flowering trees is secured by the honey-sucking parrots and other birds and by the honey-eating beetles, of which there are great numbers). The uncertainty of the times of blossoming is extremely disconcerting to the apiarist. In Europe the field crops, the fruit and forest trees, the heather, have little variation in their times of blossom. In North America bee-keepers can count upon clover, bass-wood forests, or mountain sage almost to a day and upon goldenrod and other meadow and marsh plants during the fall. In Cuba and tropical South America the honey-flow is always in the winter months. In Northern Asia and in Canada the yield is governed by the annual melting of the snow. In India it appears that the migratory *Apis dorsata* is sufficiently regular in its habits for its native owners to date by. But in Australia, at any rate in Southern Queensland, it is abnormal for the eucalyptus to blossom in successive years within weeks or even months of the preceding time of flowering. Besides the irregularity due to wet or dry seasons, eucalyptus trees vary exceedingly in the normal time of flowering according to the individual kinds. *E. maculata* (« spotted gum ») flowers usually in midwinter; *E. tereticornis* (« blue gum ») about August; *E. crebra* (« red ironbark ») about September; *E. melanophloia* (« silver-leaved ironbark ») early in December; *E. siderophloia* (« grey ironbark ») sometimes in December, oftener later; *E. corymbosa* (« blood-wood ») about March, etc. Furthermore the blossoming of individuals fluctuates much according to their distance from the coast or position north and south.

Among the most numerous of the *Myrtaceae* are the « tea-trees », all of which are rich in honey, the finest quality being obtained from the « red bottle brush » or « river myrtle » (*Callistemon lanceolatus*). The « paper-barked tea-trees » (*Melaleuca leucadendron* et var.) and other swamp varieties have abundance of honey, but of a rank, objectionable flavour and smell, and dark in colour. All the *Angophorae* (« apple-trees » and « sugar gums » especially the « sugary-gum » (*Angophora lanceolata*) and the *Tristaniae*, especially the « swamp mahogany » (*Tristania suaveolens*) are also valuable honey producers. The marshes and swamps on the coast are covered with honey-plants, including a number of varieties of tea-trees and grass-trees and the mangrove. But the honey gathered from such localities near the sea is very strong, salty and dark. In the honeys of the eucalypts there is not the slightest suggestion of the flavour of the oil secreted by the leaves.

2847 A. DE WINKELRIED BERTONI. **Keeping Native Bees in Paraguay.** (Sobre la cria de las abejas indigenas del Paraguay). *Revista de Agronomia y Bolletin de la Estaciôn agronomica de Puerto Bertoni*, tomo IV, N. 8, Pp. 31-24. Asunción, Agosto y Septiembre, 1910.

The writer has made several attempts to domesticate the native bees of Paraguay and obtained six successful results. As these bees yield a more aromatic honey and a higher priced wax than those of the European bee (*Apis mellifera*), the writer advises agriculturists to repeat his experiments and carry them further. The bees of the genus *Melipona*, whose honey is always exquisite, were docile to domestication, but they were attacked by a parasitic Dipteron.

Paraguay

The species which the writer succeeded in breeding are the following:

"Tumbihkihrasá" (*Melipona quadrifasciata*). It builds its nests in the hollows of trees. Excellent honey. Wax of a steely grey colour lighter than that of other species of the same genus:

"Tumbihkihrasá-ihvihgwih" (*Melipona Sanctihilarii*). As indicated by its native name, this species makes its nest under ground, where it deposits its honey, which is perfumed. This is one of the species most worthy of breeding, owing to the excellence of its product.

"Eira-Avyu" or "Eiru (*Melipona nigra*) and "Mondori" (*M. marginata*). These are active honey producers. They make their nests in hollow tree trunks. In Upper Parana there is a serious obstacle to their domestication in the shape of parasitic flies. To obviate this drawback, it is recommended to use a hive, the entrance of which communicates first with a double bottom. The Indians in upper Monday are in the habit of replacing the larvae in the same hollow where they have found the honey comb and blocking up the hole they make to extract the honey.

"Eirati" or "Kuañeti" (*Lestrimellita limao*). Produces a great deal of honey and is easy to raise in large closed boxes. Nevertheless, this species is very war-like and attacks neighbouring swarms. Its honey does not please everybody owing to its strong smell of aromatic essences; moreover, it may contain foreign substances causing colic. In the wild state this bee builds its nest in the trees, where they are easily detected by their enormous entrance.

"Karavosá" or "Eira-Apuá" (*Trigona mamalthea*). This common bee, which builds a spherical, badly attached nest, can hardly be recommended because it is aggressive and dirty; nevertheless, it is very easy to rear; it is only necessary to convey its nest to a

shrub and it will definitely take up its abode there. In Paraguay there are two varieties : *Ruficrus* Lat. and *Fuscipennis* Friese.

" Tapesuá " (*Trigona bipunctata*). Lives in hollow tree trunks. The writer easily succeeded in breeding it in small closed boxes at Yaguarasapa. It produces a fair quantity of best quality honey. The wax is yellowish and soft as with all the species of the genus *Trigona*.

The " Eiraihvihgwih " (*T. zigona quadripunctata* and *T. subterranea*) yields similar products. They make their nests under ground, but the former alone gave good results when kept under conditions similar to those of the wild state.

" Eirù-su " (*Trigona capitata* Sm.). This is one of the species producing most honey and wax. In an old hive, 16 litres of honey were gathered. It could be reared in closed boxes.

" Yateì " (*Trigona jaty*). Its honey is most appreciated. It is aggressive but nevertheless easy to domesticate.

" Vorá " (*Trigona clavipes*). The honey is slightly acid and the bees are aggressive. This is the species, however, which produces the largest quantity of honey.

" Eira-Tatà " (*Trigona tataira*). Can be domesticated. Honey mediocre, very thick. The wax cannot be purified owing to the large quantity of woody substances it contains. A dangerous species because of the formic acid it secretes which produces inflammation in the skin of the person stung. From this property it derives its native name.

The " Apihnguarei " or " Mirí " (*T. Zigona droryana, T. emerina, T. bilineata*) are species not yet clearly clsssified. They are easy to rear in houses ; wax almost white, excellent ; honey far from abundant and turns sour in winter.

A Canadian Act for the Suppression of Foul Brood among Bees, in Ontario. (Bee Diseases in Ontario). — *Ontario Department of Agriculture - Fruit Branch - Bulletin* 190, pp. 11. Toronto, Ont. May, 1911. 2848

His Majesty, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows :

1. This Act will be known as " The Foul Brood Act ". Canada : Ontario

2, The Lieutenant-Governor in Council, upon the recommendation of the Minister of Agriculture, may from time to time appoint one or more Inspectors of Apiaries to enforce this Act, and the inspector shall, if so required, produce the certificate of his

a pointment on entering upon any premises in the discharge of his duties. And the Minister shall instruct and control each inspector in the carrying out of the provisions of this Act. The remuneration to be paid to any inspector under this Act shall be determined by order of the Lieutenant-Governor in Council.

3. The inspector shall, whenever so directed by the Minister of Agriculture, visit without unnecessary delay any locality in the Province of Ontario and there examine any apiary or apiaries to which the said Minister may direct him, and ascertain whether or not the disease known as "foul brood" exists in such apiaries; and wherever the said inspector is satisfied of the existence of foul brood in its virulent or malignant type, it shall be the duty of the inspector to order all colonies so affected, together with the hives occupied by them, and the contents of such hives, and all tainted appurtenances that cannot be disinfected, to be immediately destroyed by fire under the personal direction and superintendence of the said inspector; but where the inspector, who shall be the sole judge thereof, is satisfied that the disease exists, but only in milder types and in its incipient stages, and is being or may be treated successfully, and the inspector has reason to believe that it may be entirely cured, then the inspector may, in his discretion, omit to destroy or order the destruction of the colonies and hives in which the disease exists.

4. The inspector shall have full power in his discretion, to order the owner or possessor of any bees dwelling in box or immovable frame hives, to transfer them to movable frame hives within a specified time, and in default, the inspector may destroy, or order the destruction or such hives and the bees dwelling therein.

5. Any owner or possessor of diseased colonies of bees, or of any infected appliances for beekeeping, who knowingly sells or barters or gives away such diseased colonies or infected appliances, shall, on conviction thereof, before any Justice of the Peace, be liable to fine of not less than 50 dollars or more than 100 dollars or the imprisonment for any term not exceeding two months, and not less than one month.

6. Any person whose bees have been destroyed or treated for foul brood, who sells or offers for sale any bees, hives or appurtenances of any kind, after such destruction or treatment, and before being authorised by the inspector so to do, or who exposes in his bee-yard, or elsewhere, any infected comb, honey, or other infected thing, or conceals the fact that the said disease exists among his bees, shall, on conviction before a Justice of the Peace, be liable

to a fine of not less than 20 dollars and not more than 50 dollars, or to imprisonment for a term not exceeding two months, and not less than one month.

7. Any owner or possessor of bees who refuses to allow the inspector to freely examine the said bees and appurtenances, or to permit them to be destroyed, when so directed by the inspector, may, on complaint of the inspector, be summoned before a Justice of the Peace, and, on conviction, shall be liable to a fine of not less than 25 dollars and not more than 50 dollars for the first offence, and not less than 50 dollars and not more than 100 dollars for the second and any subsequent offence, and the said Justice of the Peace shall make an order directing the said owner and possessor forthwith to carry out the directions of the inspector,

8. Where an owner or possessor of bees disobeys the directions of the said inspector, or offers resistance to, or obstructs the said inspector, a Justice of the Peace may, upon the complaint of the said inspector, cause a sufficient number of special constables to be sworn in, and such special constables, shall, under the directions of the inspector, proceed to the premises of such owner or possessor and assist the inspector to seize all the diseased colonies and infected appurtenances and burn them forthwith, and if necessary the said inspector or constables may arrest the said owner or possessor and bring him before a Justice of the Peace to be dealt with according to the provisions of the preceding section of this Act.

9. Before proceeding against any person before a Justice of the Peace, the said inspector shall read over to such person the provisions of this Act, or shall cause a copy thereof to be delivered to such persons.

10. Every beekeeper or other person who is aware of the existence of foul brood, either in his own apiary or elsewhere, shall immediately notify the Minister of the existence of such disease, and in default of so doing shall, on summary conviction before a Justice of the Peace, be liable to a fine of 5 dollars and costs.

11. Each inspector shall report to the Minister as to the inspection of any apiary in such form and manner as the Minister may direct, and all reports shall be filed in the Department of Agriculture, and shall be made public as the Minister may direct, or upon order of the Legislative Assembly.

12. Chapter 283 of the Revised Statutes of Ontario, 1897, entitled "An Act for the Suppression of Foul Brood Among Bees", is repealed.

2849 **Isle of Wight Bee Disease** (1). — *The Journal of the Board of Agriculture.* Vol. XVIII, No. 5, p. 400. London, August, 1911.

Great Britain: Isle of Wight

In some of the outbreaks of this disease investigated, the spores of *Nosema apis* have been found in enormous numbers in the cells lining parts of the alimentary canals of the affected bees. These cells become completely disorganised and eventually the spores escape from them and are voided in great numbers in the excrement. Such cases, which appear to be more frequently met with in the spring, are undoubtedly due to infection with this parasite.

In most of the outbreaks recently investigated, few spores, if any, have been found, but parasites, which are probably young stages in the growth of *Nosema apis*, are usually present in the cells lining the intestinal tract.

It appears probable therefore that during the colder months when the bees show little activity, the parasites grow and reach the spore stage before the bees succumb; while during the warmer months the rapid multiplication of the parasites often kills the bees before the spore stage is reached.

Experiments have proved that normal bees may be artificially so severely infected that the intestinal cells are crowded with spores. Infection may be produced in various ways:

a) by feeding with spores;

b) by feeding with candy on which infected bees had fed;

c) by mixing naturally infected excrement with the food;

d) by confinement in a box, in which an infected bee has travelled, and;

e) by contact with dead infected bees.

The investigations and experiments which have been made hitherto seem to indicate that the Isle of Wight disease is due to infection with *Nosema apis*, but that the symptoms of the disease and the growth of the parasite within the affected bees are greatly influenced by various conditions.

2850 **The Production of Honey in Cuba**. — *Journal of the Royal Society of Arts.* No. 3058, pp. 826-827. London, June 30, 1911.

Cuba

The production of honey in Cuba has long been a well-established industry. It is at present carried on with more or less activity in a way which to some extent approaches modern methods. The

(1) See Abstr. 1490 *Bull.* May, 1911.

bee, which is extremely widespread in Cuba, in consequence of the climate and flora which may practically be regarded as perennial, was subjected to very rational selection, which resulted in replacing the native bee almost everywhere by the varieties of Southern Europe and America.

The exportation of honey and wax from Cuba to-day forms a financial item of the utmost importance. According to the official statistics for 1909 there was exported a total of about 4 500 000 kilogms. of honey, of which the United States took 2 million klgs. and Germany 1 300 000.

There were exported 750 000 kilogrammes of wax, 325 000 kilogrammes going to the United States and 300 000 to Germany.

A. Sartory and E. Moreau. **Bacteriological Study of Honey.** — (*Ann. des Falsificatiens*, No. 4; pp. 259-263. Paris: May, 1911. Abstr. in *The Analyst*, Vol. XXXVI, No. 424, p. 353. London, July, 1911. **2851**

Bacteriological examination of samples of honey from different parts of France, detected the following species of bacteria within the cells of the comb; *B. subtilis*, *B. megaterium*, *Sarcina lutea*, *B. aerophilus*, *Micrococcus radiatus*, and *Staphylococcus pyogenes*. In the same samples the following fungi were found: *Penicillium glaucum*, *Rhizopus nigricans*, *Mucor racemosus*, *Aspergillus gracilis*, *Sterigmatocystes nigra*, and yeast. Among the bacteria was a yellow species which liquefied gelatin, and appeared to be intermediate between the *B. luteus* of Flugge and the *B. flavus* of Macé. The yellow pigment secreted by this bacillus was soluble in absolute alcohol. It was produced most abundantly at the optimum temperature (30° C., or 86° Fahr.) for the growth of the organism. **France**

Rivet. **Protection of Birds Useful to Agriculture.** — *Revue des Eaux et Forêts*, 9e année, No. 17, p. 539. Paris, 1 Sept. 1911. **2852**

At the sitting of the National Society of Agriculture on the 26th July, a circular of the Swiss Government relating to the protection of birds was laid on the table.

In this connection an interesting statement has been made by M. Rivet. As M. Coaz, Chief Federal Inspector of Forests at Berne, observes, the Swiss are aiming at fostering insectivorous birds, in the interests both of sylviculture and of agriculture **Switzerland France**

properly so called, with the further intention of making the country more attractive by increasing the number of birds.

As regards this latter point, M. Rivet remarks, from the forester's point of view, that birds which are usually very numerous in forests where the trees are deciduous, are, on the contrary, very rare in conifer woods.

Hence the introduction of deciduous trees, and especially of fruit trees, among conifers, is strongly advisable; and with regard to clearing and thinning, all the fruit trees that are found should be carefully preserved, as well as, here and there, despite all the rules, bushes and shrubs that bear berries or small fleshy fruit.

2853 HENRY OLDYS, C. E. BREWSTER, and FRANK L. EARNSHAW. **Game Laws in the United States for 1910. A Summary of the Provisions relating to Seasons, Shipments, Sale, Limits and Licenses.** — *U. S. Department of Agriculture. Farmers' Bulletin* 470, p. 3. Washington, August 21, 1911.

United States

The present bulletin, containing the twelfth annual summary of the game laws of the United States and Canada, has been prepared on the same general plan as those issued each year since 1902. It differs from other publications on the game laws in several important points: (1) Inclusion of a brief but comprehensive review of the measures enacted; (2) Arrangement of provisions by subjects instead of by States; and (3) Adoption of a uniform statement and order of the various details to facilitate ready comparison of similar provisions in different States. Its chief objects are to present in convenient form the restrictions on hunting which affect the enforcement of the Federal statute regulating interstate commerce in game, and to show the trend and general condition of legislation from year to year. Provisions relating to seasons, shipment, sale, limits, and licenses are included.

2854 WALTER SIMPSON. **Fox Farming.** — *The Farmers' Advocate.* London, Canada, Vol. 46, No. 989. Sept. 7, 1911, pp. 1482-1483.

Ganada

Eighteen or twenty years ago a man named Oulton commenced breeding black foxes for their skins (1). Crosses between red

(1) *Canis Vulpis var. nigra.* Cf. C. D. SHERBORN, *Index Animalium*, 1758-1800; p. 1065. Cantab. 1911.

and black foxes frequently yielded black offspring. In recent years others in the same neighbourhood took up the industry and soon a keen demand sprang up for stock foxes. Prices increased until today, and good black foxes are now selling in pairs at from four thousand to six thousand dollars.

Fox breeding farms are usually located in quiet groves, preferably containing much underbrush. The area enclosed is surrounded with strong wire netting resting on concrete wall which goes down to rock or solid clay. A den is provided for the female and family, the entrance to which is by a long passage. Each den has a door by which the owner may enter. Each male fox has a den and small yard for exercise.

Litters range from 3 to 9, averaging about four. There are on one island about 40 fox farms and 450 black foxes valued at about $ 900,000.

Tarabagan *(Arctomys Bobac)* Fur Trade in Russia, in 1910. *Questions diplomatiques et coloniales*, XV^e^ année, No. 348, pp. 250-251. Paris, 16 Août 1911. **2855**

The fur trade was very brisk in Russia in 1910. The yield of the chase was exceptionally abundant in Siberia ; on the other hand in the North Eastern region, the produce did not exceed the average; though ermine was in some places rather more abundant than in 1909, the squirrel in turn was scarcer. Hare skins were plentiful on the market.

The rodent known under the name of " tarabagan " (*Arctomys bobac*) (1) is very dangerous from the point of view of the propagation of plague, and therefore the Russian administration stopped, on the frontier of Mongolia at Ourga and Troitskosavsk, 1 500 000 skins intended to be imported into Russia. These skins will only be allowed to pass the frontier, if the owners of the goods are able to prove that the skins come from uninfected regions.

(1) The *Arctomys bo ac*, also known under the names of " Bobaco " *Marmotte bolec*, " Der Bobac ", " The Bobac " or " Poland Marmot ", is found in Galicia, South Poland, Bukhovina, and throughout Russia and southern Siberia. The eastern limit of its habitat has not been fixed. Its flesh is eaten and its skin is used. Cf. A. E. BREHM, *Merveille de la Nature; Les Mammifères* (édit. franc. par Z. GERBE), Vol. II, pp. 75-76, fig. 37. Paris, Librarie J. B. Baillière et Fils. (*Ed.*)

2856 **Protection of Birds and Fish in Grenada.** — *The Agricultural News*, Vol. X, No. 241, p. 233. Barbados, July 22, 1911.

Windward Islands: Grenada

The Grenada *Government Gazette* for May 1, 1911, contains the draft of a Bill entitled an Ordinance to Amend the Provisions of the Birds and Fish Ordinance, 1891. This provides for the extensions of the close season to various birds and to oysters, turtle, fresh water mullet and cray fish; it also prevents the exportation of any bird or any parts of a bird specified in the First Schedule to the Principal Ordinance. This schedule, which contains the names of birds that are absolutely protected by the law, is amended by the addition of the names of the ground dove (1), pea dove or perdrix, hawks and eagles, the pelican, herons and egrets. Among partially protected birds (in the Second Schedule to the Principal Ordinance), the Trinidad ground dove and the pea dove or perdrix are transferred to the lists of birds having absolute protection.

This bill repeals the Birds and Fish Protection (Amendment) Ordinance, 1908.

2857 C. H. SCHULTZ. **Fish and the Control of Parasites of Live-stock.** — See above, Abstr. 2754.

2858 LESOURD. **Fishing and Pisciculture in Switzerland.** (La Pêche et la Pisciculture en Suisse). Paris: Librairie du «Pecheur Populaire», 130 pages.

France: Switzerland

This little book records the impressions of Mr. Lesourd derived from a tour in Switzerland. The following are his conclusions with regard to France:

«We ought to apply ourselves more and more to fish raising, and specially to use selective methods; the results cannot but benefit every one. We own water areas which bring in little or nothing: whereas, wherever a careful systematic method has been employed, the results have never failed to be remunerative. The ponds of the Somme, to mention no others, are now being rationally exploited, and yield a net revenue of 80 frcs per hectare, or about £1 6*s.* per acre.

(1) Ground Dove = *Chaemephelia passerina terrestris* (Chapm). Cf. ARTHUR TREZEVANT WAYNE, *Birds of South Carolina:* 1910. p. 66. (*Ed.*).

Çannot that which is done in Picardy be done elsewhere? There are for instance in Limousin and Auvergne many lakes and ponds, the latter especially suited for trout raising, where at present there is nothing to be found but second-rate fish, such as, carp, pike, perch, roach and tench. In these districts the fishing profits, after deducting expenses, are represented by a ridiculous figure ".

" Thanks to rapid carriage and cold storage, fish can now be easily sent long distances in a perfect condition. It is Denmark especially that shows what can be done in this direction with a well developed system of pisciculture... ".

" Food obtained from water is no less important than that which is raised on land. inasmuch as it adds to our means of existence. It is surely an economic principle of the first importance to neglect none of the resources which nature has placed at our disposal ".

The International Exhibition of Aquiculture. — *Revue des Eaux e Forêts*, 9e année, No. 17, p. 541. Paris, 1 Sept. 1911. 2859

The International Exhibition of Aquiculture, of Pisciculture, of Oyster Raising, of Fishery, and of the Industries Connected with the Utilisation of Water will be held in Paris, at the Grand Palais, in the months of November and December of this year. France

This Exhibition, planned for the purpose of giving prominence to a number of industries, which till now have been left in the background, enjoys the patronage of all the Chambers of Commerce on the French littoral, namely, Marseille, Nantes, Havre, Boulogne, Calais, Toulon, Fécamp, Abbeville, Rouen, Nîmes, Saint-Nazaire, Beziers, Brest, Caen, Cette, Dieppe, Saint-Brieuc, Dunkerque etc., and lastly that of Paris. Most of these Chambers will exhibit valuable collections.

This Exhibition will bear an international character owing to the many important foreign sections which will be attached to it.

L. Wilk. **The South-Swedish Fishery Society's Experiment Station** (Die Versuchsstation des Südschwedischen Fischerei-Vereins in Aneboda). — *Oesterreichische Fischerei Zeitung*, No. 18, pp. 278-289. Wien, 15 September 1911. 2860

The produce of fresh-water fisheries in Sweden is probably lower at present than twenty or fifty years ago ; this is largely due to the lessening of rainfall seen in the lowering of the lakes. Sweden

The proper management for fishing purposes of the 3 600 000 hectares (8 900 000 acres) of inland lakes in Sweden would be of great economic importance. At present they yield only 3 kg. per hectare (2 2/3 lbs. per acre), whereas the poorer lakes of Evois in Finland give about twice as much, and middling good lakes in Germany give 15 to 30 kg. (13.38 to 26.76 lbs. per acre).

In 1906 the first fishery experiment station was founded at Aneboda (Kronoberg Province), by the Södra Sveriges Fiskeriförening ; it is also subsidised by the State and the Agricultural Chambers.

Its aims are :

To establish proper systems of fish-breeding in Sweden ; to find out and distribute the species best suited for Southern Sweden ; to found a school for fishermen and fish-breeders ; and to publish information.

The Station has 50 hectares (125 acres) of water at its disposal. It is working on the feeding of fishes, and collaborates with the Fresh-Water Biological Station.

2861 **Fish Culture in Canada.** Commission of Conservation: Canada. *Lands, Fisheries, and Game ; Minerals.* Ottawa : The Mortimer Co. Ltd., 1911, pp. 156-157.

Canada

During the past year 1 024 282 000 fry were planted in Canadian waters by the Dominion fish hatcheries. Some idea of the extension of this work may be had if we remember that the number of fry planted in 1905 was 627 541 000, while in 1900 it amounted to only 265 941 000. Notwithstanding the enormous output of the hatcheries in 1909, Canada cannot yet rival the production of those of the United States, which, in that year, planted 3 107 131 910 fry.

The number of hatcheries in operation, of course, shows a corresponding increase. In 1900, there were 12, in 1905, 28, and last year the number was 37. In other words, the number of hatcheries in ten years has increased by nearly 210 per cent, and the output by about 285 per cent.

The total expenditure in 1909 on fish culture in Canada was $180 345. The amount voted for this purpose was $322 300 ; so that approximately 56 per cent, of the authorized amount was expended. The expenditure for each province, and the number of hatcheries in each, was as follows:

	Expenditure Dollars	No. of Hatcheries
Nova Scotia	15 722	5
New Brunswick	21 102	5
Prince Edward Island	8 130	3
Quebec	19 292	8
Ontario	22 614	5
Manitoba	14 386	3
British Columbia	66 847	8
General Account	12 240	

D'AUGUST THIENEMANN. **A New Bacillus of the Red Plague in Carps and Tenches.** (Ein neuer Erreger der Rotseuche der Karpfenartigen Fische). — *Fischerei-Zeitung*, No. 13, München 1 Juli 1911. **2862**

The writer has observed the presence of a new bacterium in carps coming from Westphalia, which present all the symptoms of carps attacked by the red plague produced by the *bacterium cyprinicida* Platen. He gives this new bacterium, which is capable of producing a disease similar to the red plague, the name of *Pseudomonas Plehniae*. By inoculation experiments the author ascertained that even for carnivorous fish, infection with *Pseudomonas Plehniae* is fatal, while its introduction into the stomach of this fish produced no effect. The gastric juice of carnivorous fish therefore kills *Pseudomonas Plehniae*. The best temperature for the culture of *Pseudomonas Plehniae* in broth or on agar is 25 to 30° C. but even at the temperature of 3 to 5° a slight growth was observed. **Germany: Westphalia**

Rock Lobsters on the West Coast of Africa and their Industrial Utilisation. (Mission Gruvel). — *Bulletin de l'Office colonial*, 4e an., No. 43, pp. 227-229, Paris, Juillet 1911. **2863**

The most northern form of the Palinuridae is *Palinurus vulgaris* Latr. of which specimens are found on most rocky points of the coast of Morocco, especially Mogador and Cape Bajador which seems to be the southern limit.

South of Cape Barbas a number of specimens are met with of an African variety of the above species, which, according to the writer, might be called *Palinurus vulgaris* Latr. var. *inflatus*, a special form presenting a highly swollen cephalothorax and deep furrows on the back and sides. This variety was met with from Cape Barbas to St. Louis at depths of 20 to 30 metres and often on shell sand. It may reach a great size. Specimens were found 0.75 metres (30 in.) in length, weighing six kilogrammes. It is not very strong and therefore it seems difficult to convey it to France alive. Besides it is not found in sufficient quantity to do so. **Marocco. French W. Africa. Angola. German S. W. Africa**

At some points of the coast of Sahara and Senegal an extremely interesting form of rock lobster, the Royal Lobster, or *Palinurus regius* abounds; it has also been found at Las Palmas (Canaries), Capes Barbas and Blanc, in Galgo Bay, in the environs of St. Louis, of Dakir, of Rufisque, on the coasts of French Guinea, Senegambia, Liberia, Grand Bassam (Ivory Coast), Accua (Gold Coast), Kotonou (Dahomey), Victoria (Kameruns), Libreville and Loango, (Gabon) at the mouth of the Congo, and as far as the coasts of Angola (St. Paul de Loanda, St. Phillippe, de Bengeula, Sao-Nicolao, Mossamedes, Praya-Amelia), altogether, along the whole of the West African coast from the 23° N. latitude to the 17° S. latitude.

This species is to-day fished on a large scale by the Breton Lobster Fishers, who go to Port Etienne (Galgo Bay) in seventeen days in smacks of 50 to 60 tons, and bring back to Douarnenez 6 000 to 8 500 " Royal " lobsters with a very small death rate.

South of Angola, on the coasts of German South West Africa a species of an entirely different form is found, the *Jasus Lalandei* M. Edr., which has become so common at the Cape that its price is 0.25 frs. (2 $\frac{1}{2}$ *d.*) each and a single cannery can treat 3 000 of them per day.

2864 **The Russian Salmon Caviar Industry.** — *Journal of the Royal Society of Arts.* Vol. LIX, No. 3068. pp. 985-986. London, Sept. 8, 1911.

Russia
Siberia

The ever-increasing demand, and the diminishring supply, of sturgeon caviar led the fishermen of Eastern Siberia to experiment with salmon roe, which had not only been considered useless for human consumption but had even been looked upon as injurious to health. Up to 1907 the fishermen in the neighbourhood of Nicolaewsk considered salmon roe as valueless, but since then, it has been shown that caviar can be made of it so as to prove commercially profitable, and of such a quality that although it cannot compare with the taste of the sturgeon caviar, it is nevertheless a great delicacy.

During the short time that experiments have been made in the Amur River and Kamtchatka it was found that the best caviar is obtained from fish over four years of age, and the best quality is obtained from the king salmon in Kamtchatka. The principal market for salmon caviar is European Russia, and it is beginning to be introduced into other countries of Europe. This caviar is known on the Russian market as *Kitovia or Krasnia Ekra* (salmon or red caviar).

AGRICULTURAL INDUSTRIES

FILAUDEAU. **Composition and Qualities of Spanish Wines Exported to France.** — *Annales des Falsifications*, IV année, No. 33, pp. 362-380. Paris, Juillet 1911. 2865

A long report has been addressed to the Minister of Agriculture in France by the author in connection with his mission to Spain. The extract contained in the above review reproduces in the form of numerous tables, interesting analytical data regarding the wines of the different regions. Occasionally it supplies in addition, interesting information on Spanish vineyards and particulars of the production and trade in wines. The following are stated to be the principal winegrowing centres of Spain. Spain

Province of ALBACETE	Heavy wine, average 13°.5, may go up to 16°. Lighter white wines (13° to 14°).
» » ALAVA	Light wines 13° & 14°.
» » ALICANTE	Red wines of 13°, 15° & 15°. Some lots of 12° and 12.5° at Alcoy.
» » ALMERIA	The grapes are exported, no wine made.
» » BARCELONA	Wines of 12° to 13°, except in the region of Panades, where they may drop to 9.5° and even to 8.5° (very few).
» » CACERES	Heavy liqueur wines.
» » CADIZ	Famous white wines.
» » CASTELLON DE LA PLANA	Some wines of 13° & 14° from Vinaraz.
» » CIUDAD REAL	Superior red and white wines 13.5°, 14° & 15°.
» » CUENCA	Small production, local consumption.
» » GERONA	Similar to the French Roussillon. The slope of the Pyrenees produces wines resembling the Banyuls. Wine grown on the plain 12° to 12.5°.

Province of GRANADA	Liqueur wines.
» » HUELVA	Good white wines 15° & 12°.
» » HUESCA	So called Aragon wines; 12° to 15°. Phylloxera rampant in vineyards; present harvest very small.
» » LOGROGNO	Fine wines.
» » LUGO	Fine wines.
» » PONTEVEDRA	Heavy wines; 14° & 15°.
» » SEVILLE	Liqueur wines.
« » TARRAGONA	Heavy wines of 14° to 15° (Priorato).
» » VALENCIA	Red wines, averaging 13°. In the region of Utiel and Requena 10.5° to 12° wines.

The four provinces of Ciudad Real, Albacete, Murcia and Manzanares form La Mancha, which is the great centre of production for white wines. The degrees here quoted are those given by Malligand's ebullioscope, and they ought to be reduced a few tenths. Nevertheless it must be said that generally speaking Spain only produces heavy wines

One of the great difficulties of any enquiry into the production and trade in wines in Spain lies in valuing the measures and estimates of price according to the different regions. To form some idea of this, and by way of proof, the following is the value in litres of the " Carga ", of the " Cantaro " or the " Arroba " according to the different localities.

The " carga " in Catalonia is equivalent tolitres 121.60 (1). The " cantaro " in Elche, Bocairente, Onteniemte, Fuente la Higuera and Jativa is litres 10.75 ; to form a hectolitre (22 gals.) 9.30 Cantaros are required.

The " cantaro " in Monforte, Monovar, Pinoso, Salinas, Hondon, Romana, Alguena, Canalosa and Huerta d'Alicante equals litres 11.50. The " arroba " in Yula equals litres 15.75; that of Jumilla, litres 15.60; that of the provinces of Albacete, Ciudad Real, Cuenca and Toledo, litres 16.13, finally the " arroba " of Villena and of Sux equals litres 17.75.

With regard to the monetary unit, it is in some places the " peseta " (2) and in others the " real ". It is therefore absolutely

(1) 1 *Litre* = 1.76 pints.
(2) 1 *Peseta* = abont 7 ½*d*. (Actual value).

necessary to the merchant travelling through the Spanish vineyards to possess a ready reckoner converting prices from or into pesetas per hectolitre.

Taken as a whole Spanish vineyards produce excellent wines, not to speak of the fine wines and liqueur wines of some regions, The Spanish vine-grower is furthermore equipped with well designed and well organised plant, and with " bodegas " which have nothing to learn as to plant, arrangement and general management, from the best cellars in the South of France, or the Bordeaux region. All that can be said is that certain producers do not carry out sufficient racking; the result is often a slight turbidity and faint taste of wood which might quite easily be corrected.

Most of the red wines (viños tintos), are overloaded with colour, so that in some parts they are called " black wines " (viños negros). Nevertheless it is becoming more and more the practice to let the wines work very little in the vat, *i.e.* to turn out wines in a night or twenty-four hours. These latter are much less highly coloured, have much more sparkle and a much more delicate taste. They are described by the name of " claro " or " claretto ".

The writer gives an interesting description of the vineyards in the provinces of Gerona, Barcelona, Tarragona, Valencia and Alicante, and particulars on the production of wine in 1910, from which the following general conclusions may be drawn:

With a few rare exceptions, the wines from that part of Spain which are shipped at Barcelona, Tarragona, Valencia and Alicante, are heavy wines similar to those of Algeria, generally of excellent contitution und rich in all elements. The attention of experts should be directed to the fact that they have a satisfactory fixed acidity, none of them having, on analysis, shown a figure below 2.20 (as $H_2 SO_4$).

The most generally observed anomaly in the constitution of the wines is the height of the ratio: alcohol to extract. This fact, already pointed out by various writers, may be due to natural or other causes; nothing but a minute enquiry at vintage time accompanied by many experiments in wine making, could indicate its cause.

Finally it appears, from this enquiry, that it is absolutely necessary, before pronouncing judgment on a Spanish wine, to know its origin, or, at least, the port from which it was exported.

2866 W. C. ETHERIDGE. **Wine Making in North Carolina.** (The « Scuppernong » as a profitable crop). — *U. S. Deptm. Agr. Exp. Sta. Work, LXVI, Farmers' Bulletin,* No. 457, pp. 24 (15-16). Washington, July 10, 1911.

United States: N. Carolina

In recent years the growing of Scuppernongs (1) for wine making has developed into a local industry of considerable importance. In the *North Carolina Station Report* 1909, p. 117, W. C. Etheridge describes methods of growing and keeping the grapes and the processes of wine making locally used. The press used for this purpose is only a flat, shallow trough, about 8 ft long, 3 ½ ft. wide at one end, tapering down to about 18 in. at the other, and having fixed at about 30 in. from the wider end a wooden roller 6 or 8 in. in diameter. This roller is covered spirally with strips of leather, which give it a better catch on the grapes and make it less liable to smash the seed than if its surface were bare. To either or both ends is fitted a crank for turning. When in use the trough is fixed between four posts at a convenient height for pouring in the grapes, and is slightly inclined for the flow of the juice. The grapes are poured into the trough behind the roller; this is slowly turned over them, crushing out the juice, which is received into a pail or tub placed beneath the lower end of the trough, and is then strained into stands usually made by sawing a good oaken barrel through the middle. The juice is afterwards filtered through some material that will catch the smaller rags of pulp and broken bits of seed which have escaped the strainer.

A filter commonly used in the eastern part of the State is made of small pieces of sea shells wrapped or mixed with clean, bright broom grass and placed in a large funnel. This is very effective in clearing the juice.

After filtering, the juice is transferred to barrels, where it may be sweetened at once, or after fermentation, this depending upon the quality of wine desired. The amount of sugar to be used in sweetening is between 2 and 3 pounds per gallon of juice. After the

(1) Scuppernong (*Vitis rotundifolia*). This vine is peculiar to the southern part of the United States (South Carolina, Florida, Georgia, Alabama, etc.) where it is the vine *par excellence*. It requires little care, and is very productive. It has no diseases, being free even from the phylloxera. Its grapes and wine are much esteemed. See L. PORTES and F. RUYSSEN; *Traité de la vigne*; O. Doin Ed. Paris. Tome I, pp. 445; and L. H. BAILEY, *Cyclop. of American Hortic.* pp. 676. London and New York, 1909. (Ed.)

juice is in the barrels the bungs are left out, until all the fermentative gases have escaped, and are then driven tightly in.

The cost of making the wine is small. Even the sugar used in sweetening is used at a profit, as it increases the volume of the wine in about the same proportion as its own volume, the value of the extra quantity of wine produced exceeding the cost of the sugar.

The Future of Australian Wines (1). — *Bulletin de l'Office du Gouvernement Générale de l'Algerie.* No. 17, pp. 259-261, Paris, 1er Septembre 1911. 2867

In the Australian Commonwealth the production of wine in 1908-09 amounted to 5 500 000 gallons, of which 730 000 *i. e.* about 13 %, were exported.

Australian dry wines contain 11 to 15 per cent by volume of absolute alcohol. Sweet wines, muscatel wines and full-bodied ports and sherries contain from 17 to 21 per cent of absolute alcohol. The average alcoholic strength of dry wines supplied for local consumption in Australia fluctuates between 11 and 15 per cent. The same dry wines with an alcoholic strength exceeding this limit, and which are generally termed " Burgundy ", represent the largest item of the import trade into England. Australia

The quality of Australian wines is comparable with that of European wines harvested under similar climates. The United Kingdom is the natural market for the exportation of Australian wines. The future of this industry has exceedingly bright prospects in England, because the prejudices which had up to now retarded its development are in process of being overcome, as a result of an energetic and skilfully conducted advertising campaign. The annual consumption of wine in England is about 675 000 hectolitres (14 850 000 gals) (2). The extent of country over which wine-growing may be successfully developed in Australia is so vast, and the varied climates and soils met with are so well adapted for the production of wines of a character similar to those of European producing countries, that there is no reason why a large part of the business in wine at present done in England by these countries cannot be diverted for the benefit of Australian wines.

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(1) See this *Bulletin* for November 1910, p. 138. (*Ed.*).

(2) The United Kingdom in 1910 imported 12 723 082 gallons of wine, of the value of £4 248 485.

See *Statesman's Yearbook for 1911*, and below, Abstr. 2876. (*Ed.*).

2868 J. LABORDE. **Characteristics of Rose Coloured and White Wines from Red Grapes** (1). — *Annales des Falsifications*. IV annee, No. 33, pp. 389-391. Paris, Juillet 1911.

France

In a previous article attention was drawn to the fact that the study of the tannoid substances in the rose coloured and white wines from red grapes supplies useful information for characterising these wines.

Examination of a few objections leads the writer to confirm his previous conclusions, modifying however those relating to the characterisation of white wines. M. Laborde records that he has not yet found any white wines which redden under the action of hydrochloric acid, cold or hot. He thinks that the failure to assume a red hue is a very important positive proof of a genuine white wine ; it would however be interesting to classify the wines of the different white varieties according to these two re-actions.

The analysis of wines, as at present usually practised, should be supplemented by studying the tannoid substances in the case of red, pink, or white wines from red grapes, of doubtful origin. The total quantity of these substances and the determination of the ratio of their constituents may considerably aid the expert in his conclusions. The action of hydrochloric acid, cold and at 120° C. (248° Fahr.) studied on the wines of the different white varieties, cultivated in each wine-growing region, will probably furnish valuable data for the characterisation of the different descriptions of white wines of these regions.

2869 **The Extraction of Wine from Lees by the Method of Diffusion, in France.** (Law settling the General Budget of receipts and expenditure for the Treasury Year 1911. — *Journal Officiel de la République Française*. Paris, 14 Juillet 1911.

France

Art. 14. I. Any person desirous of undertaking (2) the extraction of the wine contained in the lees of vintage grapes, by means of the process known as diffusion is required to make a declaration to that effect to the Excise Office at least eight days in advance, and to submit to inspections and verification by the Indirect Taxes Officers during the continuance of the operations and for eight days after their termination.

The declaration referred to in the preceding paragraph must state the stock of wines in the possession of the declarant, the

(1) See *Bulletin* for May 1911, Abs. 1497.

(2) See Abs. 255, *Bulletin* for January 1911. (*Ed.*).

duration of the work, the number and capacity of the diffusion vats, and also the quantity of lees to be used; it shall be supplemented where necessary, as and when fresh products are put into working or brought on to the premises.

The operations of diffusion may only be carried out on unpressed lees, unless adopted in a distillery with a view to obtaining a liquid intended for distillation.

The wine obtained must be immediately placed in casks bearing, in conspicuous letters, the words " Diffusion Wine ". It shall be taken stock of by the Department of Indirect Taxes, and kept in special receptacles until the expiry of the time specified in the first paragraph, unless it has been previously despatched. During this time it may not be diluted or mixed either with vintages or with ordinary vintage wines.

Any excess found of the stock mentioned in the last preceding paragraph shall be liable to seizure.

No manufacture of " piquette " (second wine) may be carried out, before the termination of the operations of diffusion, on premises having inside communication with those where these operations are carried out.

Offences against the enactments of the present article shall be punishable with a fine of 500 to 5 000 francs, and confiscation of the liquids and lees seized.

II. The second paragraph of article 9 of the law of the 6th August 1905, ends as follows :

The " removal voucher " which the conveyor is required to produce to the officers in respect of any removal of wine on its leaving the forwarding establishment shall be provided with a check coupon containing the same particulars as the " removal voucher " itself. This coupon must be detached at the time of removal of the liquor, and affixed on the most conspicuous bottom of the largest cask in the consignment. When bottles are in question, it shall be stuck on one of the baskets or cases containing them, and failing baskets or cases, on the neck of one of the bottles.

P. V. DER HEIDE and W. J. BARAGIOLA. **On the Analysis of Wines.** **2870**
(Beiträge zur Chemie und Analyse des Weines. Untersuchung eines Weines, Kritik der Verfahren und Deutung der Ergebnisse). — *Landw. Jahrbucher*, XXXIX, B. 6, pp. 1019-1081 + 2 tab. Berlin 1910.

In connection with a complete series of chemico-analytic and physico-chemical investigations into a Moselle wine " Enkircher **Germany**

Steffenberg 1901" the writers put forward the following considerations.

1) Phosphoric acid in wine is only found in the form of primary salts, while sulphuric and hydrochloric acids are completely combined with their bases.

2) The sense usually attributed to the term "total acidity, free and combined" is open to the most stringent and fundamental criticisms; it is also proposed to abolish the calculations of acidity in tartaric acid.

3) In its place a calculation of the free, or semicombined acidity, on physico-chemical data will be drawn up.

4) It is proposed to make an approximate computation of the malic acid and other organic acids, the amount of which cannot be ascertained, as well as of the original acidity of the substance subjected to fermentation.

5) In conclusion the writers recommend the employment of physico-chemical methods, as stringent as possible, in wine analysis, because the results of these investigations, which complete and confirm the results of simple chemical analyses, may furnish additional information.

2871 **Contassot's Ebulliometer for Wine Analysis.** — *La Nature.* No. 1993 p. 189, Paris 19 Août 1911.

A Parisian inventor, M. A. Contassot, has just patented an ingenious ebullioscope, which combines the improvements previously devised, and possesses new and very interesting features. His appliance consists of two boilers with bottom heating tubes passing
France close to each other through the flame of a small spirit lamp placed at the back. On these boilers which are, at the beginning of each test, filled, one with the wine for analysis, and the other with water, two thermometers, and the vessel containing the refrigerating water are fixed by means of three swivel screws. Each thermometer is curved horizontally, one to the right, the other to the left, the stems being supported by a robust metal cross-bar.

Under these circumstances — and this is the most interesting point in the new appliance — the correction for atmospheric pressure can be made absolutely automatically. As a matter of fact, he left hand index-tongue which is made to coincide with the end of the mercury column of the water thermometer, is connected by means of reverse thread screws on the driving rod with an index-tongue mounted on the right. When reading off, the point zero (pure water) of a sliding and movable rule is placed on a level with the

index. It is then sufficient to read off the degree on the rule reached by the mercury of the right hand thermometer (the side where the wine boils), and the percentage of alcohol contained in the wine tested is immediately found. The rule in the Contassot appliance is graduated to show directly the alcoholic degree of the wines, which admits of much more convenient reading off than with appliances where the thermometer degrees must be converted into degrees of alcohol by means of special tables or slide rules.

These advantages will be the more appreciated, as ebullioscopes generally are merely used for rapid tests carried out by wine growers and dealers. For laboratory analyses, where the maximum precision is indispensable, it is preferable to ascertain by means of Gay-Lussac's alcohometer, the degree of density of the mixture of water and alcohol, separated from the other constituents of wine by a small Salleron still. The Contassot appliance however allows of extremely rapid operation ; it can be almost instantly dismounted, the twin boilers admitting of the correction test being carried out at the same time as the main test ; lastly the arrangement for obtaining directly the percentage of spirit operates automatically.

J. Tilmans. **The Presence of Nitric Acid in Natural Wines.** (Über den Salpetersäure-Gehalt von naturreinen Weinen). — *Zeitschr. für Untersuchung der Nahrungs- und Genussmittel*, B. 22, H. 4., pp. 201-207. Berlin, 15 August, 1911. 2872

The writer carried out these investigations with the object of ascertaining the precise value of the determination of nitric acid in wine as a means of detecting dilution.

These enquiries led him to the following conclusions : Germany

The method adapted by M. Tillmans for the determination of small quantities of nitric acid in milk cannot be applied to wines ; the latter generally contain substances likely to impair the diphenylamin reaction.

Nevertheless, quantitative determination by means of sulphuric acid in the presence of diphenylamin may be carried out with sufficient accuracy by treating the wine with animal charcoal and operating on a very dilute solution. The greater part of the wines analysed by the writer (wines of the Palatinate, Moselle, the Rhine and Alsace), contained nitrates up to milligrammes 18.75 N_2O_5 per litre.

Quantitative determination, and still more, qualitative determination, of nitric acid in wine, therefore possess no value whatever for detecting dilution in the wines examined by the writer.

2873 P. G. MESTRE. **Sulphurous Acid in White Wines.** (Ann. des Falsifications, 1911, 4, 266-276). Abs: *The Analyst*, Vol. XXXVI, No. 424, p. 351. London, July 1911.

A complete analysis is given of 103 samples of white wine made in Gironde during several years since 1893, and of 34 commercial samples. In estimating the amount of free and combined sulphurous acid, a correction of 14 mgrms. of sulphur dioxide per litre was made in each case, this figure corresponding to the average amount of iodine consumed by the musts produced in the South-West of France. The average results of some of these years are summarised in the following table:

France

Wine	ORIGIN	Total Sulphur Dioxide Mgrms. per Litre			Free Sulphur Dioxide Mgrms. per Litre		
		Max.	Min.	Mean.	Max.	Min.	Mean.
Wine in Bottles of 1901, 1902, 1903, 1904, 1905.	Rive gauche (1)	288 —	230 —	259 —	53.90	31.40	40.13
	Rive droite	345 —	310 —	327 —	76.80	23 —	51 60
	Graves	257 —	194 —	225 —	34 —	16.50	25.25
Wine in casks of 1906, 1907, 1908, 1909	Rive gauche	349 —	149 —	239.70	77 —	16.97	43.38
	Rive droite	395 —	182.75	290.25	61 —	36.25	48.50
	Graves	215 —	95 —	192.75	81.90	14.80	43.47
	Entre-deux-mers	294.75	126 —	215 —	72.90	16.33	43.50
Typical commercial samples	Rive gauche	362 —	203 —	307 —	84 —	23 —	61 —
	Rive droite	450 —	212 —	361 —	93 —	38 —	64 —
	Graves	446 —	288 —	388 —	89.60	39.40	68.20
	Entre-deux-mers	370 —	238 —	300 —	113.90	6.40	34.70
Wine in casks of 1906, 1907, 1908 (excluding 1909)	Rive gauche	404.6	180.5	282 —	87.60	17.90	47.50
	Rive droite	420 —	210.3	320 —	63.33	40.60	50.60
	Graves	273 —	118.6	247 —	105.30	17.13	54.81
	Entre-deux-mers	408.5	101.6	260 —	76 —	22 —	33 —

(1) *Rive gauche* or *Rive droite:* i.e., left or right bank of the Gironde; *Graves* = wine from the flinty and sandy soil of the Bordeaux district; *Entre-deux-mers* = wine from the district situated at the confluence of the Garonne and the Dordogne. (*Ed.*).

E. VOISENET. **On a Ferment Producing Bitter Taste in Wines, an Agent of Dehydration of Glycerine.** — *C. R. Ac. des Sciences*, T. 153, No. 5, pp. 363-366. Paris, 31 Juillet 1911. 2874

The writer has made a study of the ferment producing acrolein at the expense of the glycerine in wines, and in this way causing a bitter taste in the latter (1). France

The ferment from a bitter wine was sown in a peptonised and sterilised culture medium, purified by passing several times through this liquid, and isolated by cultures on gelatine plates.

The isolated bacillus is facultative aerobic ; it is very easily cultivated, preferably at temperatures of about 30° C. (86° Fahr.) appearing in the form of a small rod measuring 1 μ wide, and 4 μ and 5 μ in length. It causes various sugars and polyatomic alcohols to ferment, especially glycerine ; it coagulates milk, and withstands desiccation and a dry heat of 100° C. (212° Fahr.) A dose of 0.15 grammes of acrolein per litre, and after habituation gr. 0.20, suffices to arrest its growth, without however killing it.

In the fermentation of glycerine, acrolein arises directly from this alcohol by dehydration. The writer did not find a substance serving as a connecting link between the two ; moreover, the usual products of fermentation of glycerine, and particularly acids, yield no acrolein when introduced into cultures. The acrolein must arise in the free state and non-polymerised.

This conversion of glycerine into acrolein by way of fermentation is held to be the result of a simple, *non-reversible dehydrating action.*

U. WEISSER. **Importation of Foreign Wines and their Inspection in Germany.** (Die Einfuhr ausländischer Weine und deren Kontrolle in Deutschland. 26ter Deutscher Weinbaukongress in Würzburg, von 8-11 September 1911). — *Chemiker-Zeitung*, Jahrg. XXXV, No. 114, p. 1048, Cöthen, 23 September 1911. 2875

After the stringent inspection and control of German wines introduced in 1909, by the new law on wines, the great importation of foreign products not complying with the requirements of this law has called forth a perfectly justified agitation among the producers and merchants in the country. Germany: Greece

(1) See Abs. 942 *Bull.* for March 1911. (*Ed.*).

Until June, the imports of foreign wines were almost equal to the total production of German wines in 1910; that is to say 864,139 hectolitres. (1) The writer proves that in many cases the wine imported was artificial wine, raisin wine etc.

The difficulty of preventing the importation of these products is connected with questions of commercial policy, and also with a certain mistrust of experts, whose work is more appreciated where native wines are in question.

Chemical analysis is very often insufficient, and the judgment given is based on tasting.

Owing to this, there is the danger of the importation of wines refractory to analysis, an importation which injured German production under the old laws ; and in this way the native wines which do not come up to legal requirements, would have the disadvantage of being replaced by foreign wines. The writer gives interesting details on the technique of the production of wines from raisins for exportation, a method adopted in Greece; also the production of second wine, the use of chemicals and above all acids, allowed abroad, among which citric acids takes the lead.

Zinc has often been found in wine, and up to now it has been impossible to explain whether the zinc is due to the receptacle or implements used in the manufacture.

Foreign wines often have a sourish smell, and several cellars have lately been infected.

Finally, there are used for the production of wine, not only chemicals and raisins, but also rotten figs etc. When tasting these blended wines, a perceptibly disagreeable flavour is often observed.

The conclusions of this report and the discussion which follows, were in favour of more stringent inspection of foreign wines.

2876 **Imports of Wines into Great Britain in 1910.** — *Questions diplomatiques et coloniales*, No. 350, p. 378. Paris, 16 Septembre 1911.

The importation of wines into Great Britain in 1910 amounted to the following figures, in gallons:

Great Britain

	Gallons	Pounds sterling
Wines in cask	12,007,250	2,283,762
Wines in bottle	365,830	180,774
Sparkling wines	1,364,556	1,783,949
	13,737,636	4,248,485

(1) 1 *Hectolitre* = 22.009 *gals.*

These wines represent, as compared with the imports for 1909, an increase of 1,289,259 gallons and 321,411 pounds sterling for wines in bottle and 112,841 gallons and 135,860 pounds for sparkling wines (1).

The following table gives the imports in gallons from the different countries :

France	3,967,113	Italy	312,095
Portugal	3,841,908	Algeria	173,600
Spain	3,195,070	Other foreign countries	152,500
Germany and Holland	1,006,245	British Possessions	1,024,705

The share of France remains at 28.8 % ; Portugal 27.9 % ; Spain 23.2 ; Germany and Holland 7.3 ; Australia 5,7 ; Italy 2.2 and Algeria 1.2.

Importation of Wines into Belgium. — *Bulletin de l'Office du Gouvernement Général de l'Algerie*, N. 17, Pp. 263-264, Paris, 1er Sept. 1911. 2877

The importation of wines into Belgium has considerably increased in 1910 as compared with the previous year. The value of wines imported in bottles rose from 11,144,567 fr. in 1909 to 16,743,123 fr. in 1910. For wines in casks the figures are 19,955,310 francs in 1909, and 30,515,072 fr. in 1910. Belgium

The quantities increased in about the same proportion as the values, so that the great increase recorded in 1910 cannot be attributed to high prices. The following is the table of imports for 1910, in hectolitres :

Algeria	2 998
Germany	16 904
Austria	797
Spain	44 360
France	323 551
Great Britain	9 999
Greece	6 709
Hamburg (Trans.)	1 757
Italy	2 519
Holland	16 705
Portugal	4 271
Switzerland	104
Tunis	696
Turkey	3 779
Other Countries	447

(1) The imports of wines into the United Kingdom in 1910 represented a value of £4,248,485, being an increase of £501,996 on the figures for 1909. The following is the value of the wines imported in 1909 from the three most important countries: France, £1,993,641 ; Portugal, £792,237; Spain, £449,455. See *Statesman's Yearbook 1911.* (*Ed.*).

2878 ADRIAN J. BROWN. **Starch Transformation in the Mash-Tub. Brewing and Modern Science** (Cantor Lectures). — *Journal of the Royal Society of Arts*, vol. LIX, No. 3068, p. 975, London. September 8, 1911.

Great Britain: England

The brewer's mashing process is an operation in which starch, together with other solid constituents of the endosperm of the malted corn, are digested or transformed into soluble matter, by the secreted enzymes of the malt. Now, among all the changes which take place in the mash-tub, the one of prime importance to the brewer is the transformation of the starch of the malt into soluble constituents, for these soluble constituents constitute the main basis of the brewer's sweet wort, and the qualities of beer as a beverage are to a very large extent determined by their composition. It is easy to understand, therefore, that the chemistry of starch transformation is a subject of fundamentel importance in connection with the brewer's art.

The birth of our modern views on the chemistry of stareh and its transformation products dates from the rediscovery of maltose in 1872 by Cornelius O'Sullivan,

A vast amount of work has been carried on in connection with the study of this question from the time of O'Sullivan's early work until the present day. Among the chief investigators of the subject; are found such names as Musculus and Grüber, Brown and Heron, C. J. Lintner Brown and Morris, Ling and Baker, Syniewski, Browner and Millar, Ling and Davis Ford, Fernbach, and Maquenne, all of whom have contributed largely to the advance of knowledge of the subject. But notwithstanding the vast amount of work which has been carried out by these and other investigators, essential points in connection with the subject are still in dispute, and at the present time there is no general agreement to accept any one of the views which have been advanced to explain the constitution of the starch molecule and the manner in which it breaks down under the influence of diastase.

Brown and Morris consider the starch molecule to be composed of 5 groups of $C_{12}H_{20}O_{10}$; four of which are similar, and easily hydrolysed to maltose by diastase, the fifth group constituting stable dextrin. The origin of the reducing dextrins being the four groups which are finally converted into maltose in unrestricted conversion.

These malto-dextrins, or reducing dextrins have been shown by Brown and Morris to be definite compounds.

From a technical point of view, the unfermentable nature of the malto-dextrins, assumed by the Brown and Morris hypothesis

to be present among the products of a restricted starch conversion, is a matter of great importance. If the starch transformation products constituting the greater part of the soluble matter of the brewer's malt wort consisted of maltose and stable dextrin only, the whole of the maltose would be transformed into alcohol and carbon dioxide during fermentation in the brewery, and the fermented liquid would be highly alcoholic and very « thin » in palate flavour owing to complete removal of the sweet « body-giving » constituents originally contained in it. Moreover, when the fermented wort was placed in cask it would contain no carbohydrate matter suitable for generating the secondary fermentation changes which are so essential for the proper « conditioning » of beer. and it would remain a thin, « flat » liquid, very different from the fulldrinking beverage charged with carbon dioxide which is recognised as beer. The brewer knows, however, that during the primary fermentation of his malt wort in the brewery the whole of the sweet-flavoured constituents of the wort does not ferment away, and that some portion is left which gives sweetness and « palate fulness » to his beer. Further, some fermentable matter still exists in the finished beer—not readily fermentable matter, or it would have fermented away during primary fermentation in the brewery. but matter capable of sustaining a slow secondary fermentation in cask or bottle for months or may be for years. Both these phenomena depend on the presence in the wort of carbohydrates possessing similar characteristics to reducing dextrins, being unfermentable by the first yeast, but fermentable by « secondary yeast » forms.

There are very many points in connection with diastase and enzymes of a kindred nature present in malt about which much uncertainty exists, Do several forms of diastase exist in malt, contributing to the different stages in the degradation of the starch molecule which have been observed by so many investigators ? From the influence of heat on the products of starch transformation, and from other evidence brought forward by Maquenne and Roux, it is probable that such may be the case, but at present there is no solid proof that it is so. Again, what is the nature and *rôle* of the liquefying enzyme which plays such an important part in the modification of starch paste, and in the solution of starch in the brewer's mash-tub ? Probably it is a different enzyme from the ordinary diastase of transformation, but there is much in connection with this question which is of great technical and scientific importance and which requires further investigation.

Consideration of such questions as these brings forward another point of great importance in brewing technology.

The hypothesis of Brown, Morris and Millar appears to be in agreement with the phenomena observed during the hydrolysis of starch by diastase under laboratory conditions when the enzyme in comparatively small amount acts on starch paste, or soluble starch. Are the results observed during starch conversion, in the brewer's mash-tub, when diastase in very large amount acts on the starch granules of malt, also in agreement with the Brown and Morris hypothesis? Viewed broadly, they present a general appearance of agreement, but looked at closely they are usually found to vary materially from those which the hypothesis of Brown and Morris would lead us to expect.

Temperature appears to influence the nature of starch transformation by diastase to a much greater extent when the action proceeds under laboratory conditions, than when it takes place in the brewer's mash-tub and it is by no means safe to assume that the results obtained at any particular temperature in the mash-tub will be similar to those obtained at the same temperature in a laboratory starch transformation. This does not, however, of necessity throw doubt on the soundness of Brown and Morris' hypothesis. This hypothesis is founded on the results of laboratory experiments in which the conditions of experiment were kept as free as possible from complicating factors. The conclusions derived from experiments such as these may be correct, and yet they may not be able to explain the nature of starch transformation in the mash-tub, owing to other actions taking place during the brewer's mashing process which obscure, or modify, the actions observed in a laboratory starch transformation.

2879 ÉM. DEHAYE. **Yield from Maize in the Brewery.** — *La Bière et les boissons fermentées.* 20e Année, No. 7, pp. 75-81. Paris, Juillet, 1911.

Experiments carried out in the École Supérieure of Louvain as to the best conditions for the most profitable use of maize without a steam cooker gave the following results.

Belgium

The experiments, which involved variation of the different factors, were applied to a vat containing 1000 kg., of which 200 kg. were maize flour used in the mash tun, or 200 kg. grits (1). The proportion of maize was also varied for a given mode of use.

(1) Usually brewers purchase maize in the form of grain freed from the germ and the husk, and known under the name of " grits ". Cf. E. BOULANGER, *Brasserie*, Baillère et fils, Paris, 1907. (*Ed.*).

Grits supplied a pleasant beer, while maize flour used in the vat produced a beer with disagreeable taste; the attenuation was small (55 %), the secondary fermentation violent, and the beer not perfectly clear.

Experiments made with different proportions of grits showed that the maximum yield for maize is given by the proportion of 20 %.

Prudence must therefore be exercised, and the proportion of maize not made excessive.

A simple plant is sufficient for the use of maize; the expense of buying and using a maize cooker under pressure is not justified at all.

The yields obtainable in this way would perhaps be a little higher, but what was gained in extract would be lost in quality.

Using maize directly in the tun must be avoided, unless it has gone through a special preparation, and in this case the cost is higher. Allowing for the difference in the purchase price of malt and maize grits, a simple calculation shows the considerable profit which the use of maize brings the brewer, and its use is advisable, provided it be carried out prudently and after the most approved methods.

A. CAPPUYNS. **Sterilizing Beer Casks with Pitch.** — *La Bière et les Boissons fermentées*, 20e année, No. 7, pp. 78-79. Paris, Juillet 1911 **2880**

Among the methods of sterilising casks for containing beer, one of the best is undoubtedly coating the inside with pitch. The objections complained of are due to the pitching not always being properly done. The writer advises the use of a good quality pitch for casks, and this, when finely divided and placed in contact with beer for some time, imparts no taste to the latter. There should be added to it 20 to 30 % of its weight of pure white, solid paraffin, which will yield a very plastic product, the melting point of which is a little higher than that of pitch alone. This product, owing to its elasticity, will stand the most violent shocks without scaling off. The pitching must be carried out at a temperature between 190° and 210° C. (374° and 410° Fahr.) and the injection of the pitch should be continued for 2 minutes at least, in small casks, and 3 minutes for casks of 200 litres (9 gals). **France. Belgium**

After this treatment, the insides of the casks are only covered with a thin coating of pitch, and the consumption of pitch is reduced to a minimum.

Immediately after pitching, air must be blown in by means of a fan, to remove the small amount of vapour which always results from the heating of pitch.

Carried out in this way, pitching forms the best practical method of keeping casks in good condition, and a radical cure for spoilt casks.

2881 **Use of Market Varieties of Apples for Cider.** (*National Fruit and Cider Inst. Report,* 1909). — *The Journal of the Board of Agriculture,* Vol. XVIII, No. 5, pp. 422-423. London, August 1911.

Great Britain: England

Market varieties of apples are usually considered of little value for cider-making, but it has been suggested that more attention should be given to their use, as a means of utilising small, unsaleable fruit, and of avoiding a glut on the market. A number of market varieties grown in the Institute plantations have been analysed, and small scale tests have been made to ascertain the type of cider produced. From the results it appears that with very few exceptions the juice is poor in sugar and tannin, while the acidity is high. The rate of fermentation is excessively high for cider purposes. These tests have, however, shown that it is practicable by suitable treatment to produce a palatable and marketable beverage.

Satisfactory results may be expected in two directions. The first consists in the utilisation of a moderate quantity of true vintage fruit of the sweet and bitter-sweet types to blend with the market sorts. By mixing suitable proportions of each type it is possibile to obtain a juice of fair average richness in saccharine matter and of modified acidity and astringency. Such a blend can be allowed to ferment to dryness, and a very fair, dry cider may be produced. It may even be possible in special cases to retain some natural sweetness by filtration, if the vintage sorts selected possess very slowly fermenting juices. The other course is to increase the original amount of saccharine matter in the juice by the addition of sugar in such quantity that, when completely fermented, the liquor will contain sufficient alcohol to restrain acetification. Such cider can then be stored long enough, without deterioration, for the excessive natural acidity to be gradually toned down and mellowed, until it is no longer too pronounced. It may then be consumed as dry cider, or, if preferred, sweetened shortly before use with a further addition of sugar. A product of this type cannot be compared with a high-class natural cider, but it may be none the less palatable, wholesome, and saleable.

In districts where considerable quantities of apples are grown for market, it is certainly worth while to devote more attention to the question of cider-making, and of utilising fruit. But for the production of the choicest types of cider, the vintage fruit cannot be replaced by market varieties.

The Production and Consumption of Cider in France. (Zider-Gewinnung und Verbrauch in Frankreich in der Sechzehn Jahren 1895 bis 1910). — *Die deutsche Essigindustrie*, XV. Jahrgang, No. 37, S. 295-296, Berlin, 15 September 1911. 2882

While in 1895 the cider production in France was 25,587,000 hectolitres, the imports 576 and exports 23,000 hectolitres, in 1910 the production did not exceed 12,333,000 and exports 15,000; while the imports amounted to nearly the same figures as in 1895. France

The total consumption in 1895 was 25,565,000 hectolitres, which gives an average of 66 litres per inhabitant. In 1910 the total was 12.319.000 hectolitres, or only 31 litres per inhabitant.,

Nevertheless, France still remains the largest producer and consumer of cider. Among the different districts, Normandy leads, and the quantity of Cider consumed there exceeds that of beer and wine together. cider being specially produced from apples, the great fluctuations shown by this product are explained.

B. T. P. Barker and V. Florian Hillier. **Cider Sickness.** — *The Chemist and Druggist.* Vol. LXXIX. N° 1650. p. 52. London, September 9 1911. 2883

At the September meeting of the British Association for the Advancement of Science held at Portsmouth, Cider Sickness was the subject of a paper by B. T. P. Barker and V. Florian Hillier. The disorder commonly makes its appearance in early summer and is marked by characteristic frothing, development of a disagreeable peculiar odour and taste, and turbidity. A bacterium has been isolated, which on infecting ciders and perries reproduces the various symptoms. The recommendations for combating cider sickness are: sterilisation of contaminated utensils, storage at low temperature, blending, to raise acidity above 0.5 per cent of malic acid, and to give a moderately rapid normal rate of fermentation. United Kingdom

2884 **The Nipa Palm (*Nipa fructicans*) as a Source of Alcohol and Sugar in the Philippines.** — *Journal des Fabricants de Sucre*, N. 36, p. 1. Paris, 6 Sept. 1911.

Philippines

The alcohol manufactured in the Phillipine Islands is obtained chiefly by fermenting the sap of the Nipa Palm tree (*Nipa fructicans*, Wurmb.), which occurs throughout the Archipelago at the mouths of streams and in marshy parts, subject to tidal influence. The production of alcohol in the Philippines is in course of increase. In 1906 it was 6 461 949 litres (1 421 628 gals) and in 1910 10 584 124 litres (2 328 505 gals). This estimate, however, does not include the very considerable quantity of alcoholic beverages manufactured by means of different substances: palm juice, sugar, sugar residue, sugar cane, rice and other grains; these beverages being prepared, without distillation, on a small scale by families.

The "Nipa" Palm tree, which is the principal source of alcohol is very useful. The leaves are used for roofing houses, making hats, mats, bags, water-pails and baskets. The petioles serve for the manufacture of brooms and withes, the fruits are used as food, the sap is drunk fresh as a beverage, or employed for making sugar, fermented drinks, alcohol or vinegar. The most important district from the point of view of "Nipa" alcohol manufacture, is Manila. In that district the largest distilleries are found; the plantations contain 700 to 800 palm trees per hectare (280 to 320 per acre).

The costs of manufacturing "Nipa" sugar are probably lower than for cane sugar.

2885 **The Wood Alcohol Industry in Germany.** — *Journal of the Royal Society of Arts*, No. 3059, p. 852. London, July, 1911.

Germany

The wood alcohol industry in Germany made slow progress until 1880, but about that time the importation of wood alcohol and pyrolignite of lime from the United States began, and a number of the wood distilling firms merely bought up these imported raw products and manufactured them into acetic acid, methyl alcohol, and denatured wood alcohol. The largest concerns, however, soon established their own distilling plants in the thickly-wooded surrounding countries of Galicia, Hungary and Russia, and imported their raw products to the refining plants in Germany.

In Austria-Hungary and Germany there were recently produced about 6 500 metric tons of wood alcohol and 27 000 to 28 000 metric tons of pyrolignite (1).

The industry has however suffered somewhat of late years owing to the large quan ity of denatured potato and grain alcohol produced in Germany.

The fact that deciduous varieties of wood are comparatively rare in Germany is another reason why the wood alcohol industry is not very far advanced.

HENRI BLIN, **A New Industrial Alcohol Extracted from the Residual Waters in Paper Pulp Factories** (2). — *La Nature*, 39e Année, No. 1998, p. 117 (supplt.). Paris, 9 Septembre 1911. 2886

For some little time several processes have been used in Sweden by which ethyl-alcohol can be manufactured from the waste waters of paper pulp factories, working with what is called the bisulphite process. These factories are very numerous in that country. The *Chimie pratique* directed attention to these processes, which mark a forward stride in the manufacture of industrial alcohol. The best known method at the present time is that of Mr Hugo Wallin, applied at Kopmansholmen, near Forss ; another method very similar that of Mr Hugo Wallin, and due to M. Gostra Ekstrom, is in use at Larkudden, near Shutskar. Sweden

The bisulphite process, in almost general use for the manufacture of paper pulp from wood, consists in subjecting the wood, cut up into small chips, to the action, in the autoclave, of a solution of acid sulphite of calcium or magnesium — sometimes a mixture of both — into which sulphurous gas has been passed until saturated. This complex and ill-defined solution forms what is known as the bisulphite liquor. The treatment of the wood tissue in the autoclave, with this liquid, results in the mechanical or chemical separation from it of cellulose, which remains almost entirely intact, and forms nearly 50 % of the weight of wood treated ; the other constituents of the ligneous tissue, lignine in particular (average 30 %) pass into solution or suspension in the residuary water, the quantities of which are large and which the manufacturer finds it very difficult to get rid of. A ton of wood yields on the average

(1) 1 metric ton = 1000 kilog. = 2 204.62 lbs.

(2) Cf. *Bulletin*, January 1911, Abs. 259. (*Ed.*).

10 cubic metres of residuary water, containing 9 to 10 % of solid matter.

By the process devised by Mr. Hugo Wallin, the residuary water, which is highly acid, is neutralised with lime; air bubbles are then passed through for converting the excess of lime added into carbonate, and promoting in this way the precipitation of carbonate of calcium and magnesium, together with the organic substances in suspension in the liquid. Aeration then supplies the liquid with the necessary oxygen for developing the yeast put in afterwards. The liquid is allowed to rest for several hours, after which, by decantation, a fairly clear liquid is separated, to which a selected yeast is added, and sometimes a little malt extract.

This liquor is afterwards subjected to alcoholic fermentation at 25° C. (77° Fahr.) which must last at least three days. On completion of this fermentation the liquid contains from 1 to 1 ½ % of its volume of absolute alcohol. It is distilled in Kubierschky columns, similar to those employed in foundries for cooling blast furnace gases and recovering the dust. Thus from 100 to 115 litres (176.07 to 202.48 pints) of absolute alcohol are obtained per ton of cellulose manufactured, which corresponds to about 2000 kgs. (4409.2 lbs.) of wood treated. The cost of manufacturing 1 litre of alcohol in this way would be 12 or 13 centimes.

At Skutskar, the factory is equipped for turning out 12 000 hectolitres (264 115.2 gals.) of alcohol per year, together with 20 000 tons of paper pulp. The crude alcohol secured by this method has a very unpleasant characteristic smell. In addition, it is highly impure, and contains probably up to 10 % of methyl-alcohol, some acetic aldehyde, acetone, furfurol and terpenes. As it stands, however, it constitutes an excellent alcohol for industrial purposes, completely denatured or methylated, because the methyl-alcohol and the acetone it contains, enter largely into the composition of denaturing agents of alcohol; there can be no idea of using it as a raw material for manufacturing drinkable alcohol.

This new industry, grafted on the paper pulp industry, is exceedingly interesting, not only because it presents a method of turning to very advantageous account the watery residues from the manufacture of paper pulp, but chiefly because it is a new source of supply of industrial alcohol.

TRILLAT. **New Industries Derived from the Treatment of Albuminoid Residues in the Alcohol Industry. M. Effront's Process.** — *Revue Scientifique*, 49e année, 2e sem., N. 10, P. 308. Paris, 2 Septembre, 1911. 2887

The albuminoid residues which are the waste products of certain industries represent a considerable tonnage ; among them mention may be made specially of distillery and sugar works residues. Bearing in mind that in Europe alone the manufacture of alcohol amounts to 18 million hectolitres (396 000 000 gals.), some idea can be formed of the considerable quantity of residue which at present goes to waste in this industry alone. France

These residues up to the present were worthless; the only use they were put to was that the distilleries which manufacture alcohol from molasses separated the mineral salts from the residues by calcination, the other products being wasted. With regard to the residues of other substances used in alcohol manufacture, such as beetroot residues and the liquid resulting from the filtration of grist in grain work etc., they are rather losses than anything else to the distilleries, which are compelled to get rid of them as best they may, either by emptying them into the rivers or canals, where they cause great damage, or by allowing them to evaporate in silos, to the great detriment of public health.

The quantity of organic nitrogen contained in these residues is enormous. This fact has by no means escaped the attention of specialists. Many and varied, therefore, are the proposed methods of treatment for recovering it; none of them however had practically achieved the object in view, which consisted in the extraction in commercial form, *i. e.* concentrated and utilisable by agriculture or industrially, of the organic nitrogen in the waste.

Fermentation, when possible, is almost always the cheapest process and sometimes the only one which may be used for bringing about the transformation of organic substances. Its mode of operation is more complex and much less thoroughly investigated than that of purely chemical reactions, and this perhaps is the reason why discoveries in connection with it are rarer.

In this matter it may be said that a great step forward has just been taken towards the solution of the problem, by the researches of M. Effront. The method contrived by this scientist is based on the action of special diastases which decompose the complex nitrogenous molecule into simpler elements in which the nitrogen

appears in the form of ammonia and amines which are chemically recoverable. (1)

It should be noted that this dissociation involves only the organic substances and does not in any way modify the composition of the mineral salts, so that the potash salts contained in the residues of molasses freed from their nitrogen burn better than before in the potash furnace. Consequently the process enables complete and economic recovery to be made of the nitrogen in the residues, and this consideration would suffice to justify its universal application. The advantages of the process are not limited merely to the production of the utilisable nitrogenous substances; the fermentation is controlled in such a way that it does not destroy the albuminoid molecule in order only to extract the ammonia and the amines; it divides it and yields, in addition to ammoniacal salts, other carburetted products in the series of volatile fatty acids. in particular acetic, propionic and butyric acids.

The application of the process is carried out in the following way. The residues, distillery pomace, percolation liquids, etc. are submitted to a special fermentation brought about by means of a culture of bacteria and directed along lines similar to those of alcoholic fermentation.

As soon as the albuminoids are decomposed into ammoniacal products and volatile fatty acids, the fermented juices are subjected to two successive distillations. The first distillation, in an alkaline medium, aims at recovering the ammoniacal bases chiefly as sulphates. The residuary liquors resulting, then free from nitrogenous products, are concentrated by evaporation. and, after being mixed with sulphuric acid, are conveyed onwards for the second distillation which liberates the volatile fatty acids.

These acids, collected in the form of crude acids, are put through various successive operations, concentration, purification, rectification, etc., which yield as finished products, acetic, propionic and butyric acids, in the different states of purity and concentration required for industrial purposes.

This method enables the recovery of 25 to 35 kilogrammes of sulphate, and almost double that quantity of organic acids per cubic metre of residue.

It will be seen therefore that the application of the process on a large scale is calculated to produce a considerable additional number of tons of sulphate of ammonia. It will also supply Euro-

(1) Cf. above, Abs. 2466 (*Ed.*)..

pean industry, which was hitherto largely dependent on the United States for the substances utilised in the manufacture of acetic acid and its derivatives, with all the products it requires.

Besides this, in addition to the manufacture of acetic acids, the application of the process will admit of producing propionic and butyric acid in large quantities at low prices. These two latter acids had hitherto not been industrially manufactured, and their high price very much restricted their use. The industrial experiments undertaken have already demonstrated that propionic and butyric acids, as well as their derivatives, were capable of utilisation in tanning, dyeing, in the manufacture of colours, celluloid, artificial silk, synthetic camphor and essences; and that they could very often replace acetic acid to advantage, both from the economical point of view and with regard to the quality of the products obtainable.

The Marseilles Peanut Oil Industry. — *Journal of the Royal Society of Arts*, No. 3068, p. 985. London, Sept. 8, 1911. 2888

The industrial grades obtained from the Indian peanuts, and the second pressings of the African varieties, are consumed mainly by the soap-making industry, but a certain proportion is also employed for illuminating and lubricating purposes. **France**

The Marseilles mills produced, in 1910, 170 000 tons of peanut oil cake. The cake is used for cattle feeding. About 80 000 tons are exported annually, chiefly to Germany and Scandinavia. Peanuts in the shell are never ground whole in the Marseilles mills. The yield of oil varies with the origin and condition of the nuts. The Senegal peanuts in the shell, yield about 33 per cent. of their gross weight, the Gambia peanuts 31 ½ to 32 per cent. Both of these varieties yield from 21 to 23 per cent. on the first pressing, and 10 to 11 per cent. on the second pressing. The average oil yield of the shelled peanuts is about 39 per cent. for the Indian nuts, and 42 per cent. for the Mozambique. After running from the presses, peanut oil does not need refining, but is simply filtered.

Pea-nut Oil and the Fish Industry of the Philippines. — *Journal of the Royal Society of Arts*, No. 3069, p. 1008. London, September 15, 1911. 2889

The latest fishery enterprise in the Far East has been the canning of sardines and anchovies in the Philippines. At the recent **Philippines**

fair held in Manila, were displayed fifty cases of sardines put up by the Bureau of Science of the Philippine Government. The fish were packed in peanut-oil of Philippine production, with the usual spices, in oval tins furnished for the experiment by local Chinese tinners.

The fish were first salted and cleaned, soaked in brine, and washed to remove the scales, dried in the open air, boiled in oil, drained off and packed. The peanut-oil can be had in large quantities at comparatively low prices.

The supply of sardines and anchovies in Philippine waters is said to be very large.

2890 **A New Tomato Seed Oil in Italy.** — *L'Agriculture commerciale*, No. 17, p. 464. Paris, 1er Sept. 1911.

A new tomato seed oil has just appeared on the market; coming chiefly from Italy (where tomato preserving is a very prosperous industry) in sufficient quantities to rank immediately in
Italy the market of fatty substances. The province of Parma alone, treating 84 000 tons of tomatoes per year, which used to throw away these seeds as a useless waste product, has manufactured 600 tons of an oil, ranking, from the chemical point of view, among the semi-siccative oils of the cotton oil class. It will therefore find an immediate demand in soap maufacture, and all industries where the last named oil is used (1).

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(1) Cf. also; PALMERI, *Studi sul Pomodoro*, Ann. Scuola Agr. Portici, 1885; PASSERINI, *Stazioni sperimentali Agrarie italiane*, XVIII (1890); BRIOSI and GIGLI, *Ibid.* XVIII (1890); BATTAGLIA, *Annali della Società chimica di Mitano*, 1901; Tomato Seed Oil. *Journal of the Royal Society of Arts*, Vol. LIX, No. 366, p. 958. London, August 25, 1911.

Tomato growing extends throughout Italy, and the manufacture and trade in the preserved fruit has made considerable strides of late years, chiefly at Catania, Palermo, Turin. Leghorn, Bologna, Venice, Milan, Bari, Reggio Emilia and in the islands of Favignana and Pantelleria. The preparation of tomato preserves is carried on not only in industrial works but also in the country, where it is a domestic industry. During the period 1902-1906 the exports of this product averaged 91 739 quintals; in 1906, 143 556 quintals valued at 5 742 240 francs (PASQUALUCCI, *Annuario d'Italia per l'esportazione e l'importazione*, pp. 246-247. Roma, 1910).

1 Quintal = 100 kgs. = 220.46 lbs.

The Almond and Oil Trade in Bohemia. — *Bulletin de l'Office du Gouvernement Général de l'Algérie.* No. 16, p. 250. Paris, 15 Août 1911. 2891

Bohemia consumes every year about 5000 quintals (1) of almonds of Italian origin, of the approximate value of 1 207 500 francs (2); to these, insignificant quantities must be added from Spain, France, the East, and Dalmatia. Bohemia

Italian importation of these fruits into Bohemia a few years ago was much more considerable; it has fallen off appreciably, however, in consequence of the competition of the shelled hazel from the Levant and the earth-nuts of Trebizonde. Sicily has

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During the eight months, January to August 1911, Italian exports of tomato preserves totalled 192 359 quintals. (*Statistica del Commercio speciale dal 1 gennaio al 31 agosto 1911,* Roma 1911, p. 273).

Fresh tomatoes contain on the average 4 % by weight of skin and 11 % of seed. The residue of preserve manufacture is a mixture of skin and seed. An examination of the dry residue shows about 66 % by weight of seed. The dry residue, treated with sulphide of carbon, yields from 12 to 13 % of oil; the seeds separated by fans from the skin, give 16 % of oil. The analysis of this oil yields the following results:

Density at 15° C	0.9244
Saponification value	189.45
Acidity value	1.823
Acidity in free fatty acids (calculated as oleic acid)	0.09165
Volatile Acidity	0.2
Iodine value (relative)	87.7

The oil cake can be used for manure.

F. Perciabosco and F. Semeraro, *Utilizzazione dei residui della lavorazione del pomodoro.* Le Stazioni Sperimentali Agrarie Italiane. Vol. XLVIII, pp. 260-272. Modena, 1910.

(1) Quintal = 100 Kgs. = 220. 46 lbs.

(2) The imports into Austria of shelled almonds, from Italy, were:

in 1908	60,865 Quintals
in 1909	36,612 »
in 1910	66,937 »
in 1911 (Jan. — Aug.) . .	23,163 »

Cf. *Statistica del commercio speciale d'Importazione ed Esportazione dal 1° gennaio al 31 dicembre 1910,* Roma, 1910, et dal 1° gennaio al 31 agosto 1911, Roma, 1911, p. 271. (*Ed.*).

gained ground in the Bohemian market, where the large white almond of that island enjoys preference.

The bulk of the imports of pure edible oils into Bohemia is supplied by France. Italy only forwards to the country small quantities of previously purified oils. The industrial French and Italian oils brought to the Bohemian market, have to sustain the powerful, organised competition of similar German, Dutch and English products. Burning oils are introduced from Istria, Dalmatia, Greece, Turkey, and Southern Italy.

2892 HUBERT, **Chemical Examination of the Oils from Different Varieties of Oil Palm Fruits (*Elaeis guineensis*).** — *La Quinzaine Coloniale*, XV^e^ annee, No. 15, pp. 540-541. 10 Août 1911.

The oil yields of the different varieties of oil Palm vary to a rather large extent, which is due in a great measure to the relative proportions of pulp and stones.

The percentages of fat from the pulp range frum 41 to 63; for the complete fruits they vary between 16 and 56. Among the latter the lowest percentages correspond to the varieties *Sempernigra*, *communis* and *vulgaris* (sub-species *nigrescens*), which have most stone. The highest yields correspond to the variety *pisifera* (of the same sub-species *nigrescens*) which have the smallest stones. In the latter the kernels in the stone are too small and their separation from the fibres is too laborious a process to give them any marketable value. For that matter the variety *gracilinux* (of the sub-species *virescens*) (1) is in practically the same position.

French West Africa

The analyses carried out by the author (on Chevalier's own samples) show that the constants of fat extracted from these different varieties do not vary much on the whole.

In any case it seems that for all these new and recently classified varieties, a very satisfactory oil yield of the pulp from the practical point of view may be relied upon, and that the fats obtained everywhere present characteristics and constants closely akin, and corresponding to those technically indicated for commercial oil.

The greater part of the fats extracted from the fruits of these varieties may be used as food stuffs. The variety *communis* and

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(1) The Latin names given to these varieties of oil palm correspond to their characteristic properties; thus the *gracilinux* is the one with the thin-shelled nuts, and the *virescens* the variety with green tinted fruit.

Cf. HUBERT, *Le Palmier à Huile*, p. 13, Paris, 1911. (*Ed.*).

especially the *sempernigra* yield highly appreciated oils ; the fruits of the *pisifera* variety are eaten fresh and fried in the countries of origin; but the variety *repanda* of the sub-species *virescens* is left alone by the natives, beaause it yields an oil producing headache and nausea, and is apparently injurious.

Saponification of Oils. — *The Chemist and Druggist.* Vol. LXXIX, No. 1, 648, p. 46. London, 26 August, 1911, 2893

Winkler (*Zeitsch. für angew. Chemie,* 1911, 36), recommends propyl alcohol as a substitute for ethyl alcohol in the determination of the saponification values of fats and oils. The higher boiling-point of propyl alcohol enables a consequent reduction in the time required for saponification; thus beeswax, which is very difficult to saponify completely, can be saponified in ten minutes without using a reflux condenser. A number of figures are given to show that all ordinary oil can be saponified with equal rapidity without the use of condensing apparatus. Germany

Glycerine Production and Exports in Spain in 1910. — *The Board of Trade Journal,* Vol. LXXIV, No. 768, p. 346. London, August 17, 1911. 2894

It appears from the July Report of the British Chamber of Commerce for Spain that the production of glycerine in that country in 1910 amounted to about 2 500 000 kilogs. (1 kilog. = 2.2046 lbs.), of which 1 500 000 kilogs. were obtained from candle lye and 1 000 000 from soap lye. The number of distilleries is about 15. The most important centres of production are Madrid and Barcelona, followed by Bilbao, San Sebastian and Seville. Spain

A large part of the production is consumed in Spain and the rest exported, mostly in a crude state, chiefly to the Netherlands, the United Kingdom, Germany and the United States. In 1910 the total export amounted to 893 760 kilogs. as against 1 043 467 kilogs. in the previous year. Of the exports in 1909, 521 374 kilogs. went to the Netherlands, and 150 707 kilogs. to the United Kingdom (1).

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(1) According to G. LEWKOWITSCH, *Chemical Technology and Analysis of Oils, Fats, and Waxes,* Vol. III, pp. 333-334, the amount of glycerine produced in Great Britain is from 25 600 to 26 500 tons, while in the United States the amount is from 16 000 to 17 000 tons.

In Italy, in 1910, the amount of glycerine exported was 1 762 900 kgs and was valued at 3 173 220 francs. In 1911, up to the end of August the amount was 1 022 900 kgs, valued at 2 045 800 francs.

(*Stat. Comm. speciale;* Roma 1910 e 1911). (*Ed.*).

2895 **Packing Beetroots for Analysis in Waterproof Sacks.** — *La Sucrerie Belge*, 40e année, No. 2, pp. 28-35. Bruxelles, 15 septembre, 1911.

Belgium

The Minister of Agriculture of Belgium on the 13th October 1908 had addressed a circular to the State Laboratories, directing a series of tests to be made with a view to determining the alterations in weight undergone by beetroots forwarded in waterproof sacks, either wrapped in leaves or pulps, or without.

The following are the most important conclusions from these tests:

1) The use of pulp as a packing material together with the waterproof sack, resulted in increase of the weight of the samples. This increase may be partly real, because pulp containing 90 % of of water may yield up some to the beetroots, whose average is less than 80 %. Nevertheless it appears to be deceptive, in part at least, because the packing pulp, on reaching the laboratory, contains beetroot radicles which must necessarily be credited to the sample, in view of the impossibility of determining their origin.

2) Packing in waterproof sacks with beetroot leaves produced a slight loss of weight, which, calculated for an average sugar content of 16 %, and presuming it to be due exclusively to the drying of the roots, only affects the result of the analysis within limits of less than 0.05 %, an amount which the method of analysing beetroots does not allow of ascertaining.

3) Packing in waterproof sacks alone led only to a loss of weight slightly in excess of that found in the case of packing in waterproof sacks and leaves.

Still, this loss being entirely attributed to evaporation, would only allow of an adjustement of less than 0.1 per cent., and may consequently be entirely neglected.

From the foregoing it results that the use of waterproof sacks with or without beetroot leaves, would practically do away with evaporation in beetroot specimens intended for analysis, and forwarded by express, as is usually done. Therefore this method entails the very valuabie advantage of eliminating all pretext for any adjustment, often the source of annoying disputes and notorious malpractices.

NOEL DEERR. **The Effect of High Temperatures on Cane-Sugar in Solution.** — *Report of Work of the Experiment Station of the Hawaii and Sugar Planters' Association, Agricultural and Chemical Series, Bull.* No. 36, pp. 45 + Hl. XX. Honolulu, Hawaii, 1911; and *Nature*, No. 2179, Vol. 87, p. 153. London, August, 3 1911. 2896

The extension of the system of multiple evaporation in the manufacture of sugar has been limited by the fact that whilst the evaporation may be effected safely under normal and reduced pressures of steam, the sugar begins to decompose when steam under pressure is used. A report on the effect of high temperatures on cane-sugar in solution, by Noel Deerr, issued from the Experiment Station of the Hawaiian Sugar Planters' Association, describes an investigation of considerable technical and scientific importance. It is shown that sugar inversion begins to be important at 110° C. but may be checked by the addition of alkali; this causes the juice to darken, but much of the colour disappears when the alkali is neutralised, and the coloration in no way corresponds with loss of sugar. Hawaii

The conclusion is drawn that the local juices may be relied upon to stand half an hour's heating at 120° C. without loss of sugar, whilst under careful control and observation a temperature of 125° C. (or even 130° for shorter periods) is permissible. This conclusion is important, not only by reason of economy in evaporation, but also because a temperature of 125° is sufficient to produce almost instant sterilisation, an effect that cannot be produced with any certainty at 100°. C. A point of considerable scientific interest, dealt with incidentally in the paper, is the reciprocal interconversion of dextrose and levulose, when the solutions are heated, either alone, or in presence of alkalis.

The Sugar Industry in England (1). — *Bulletin Mensuel de l'Office de Renseignements Agricoles*, No. 5, pp. 591-596. Paris, Mai, 1911. 2897

At the present time the United Kingdom imports almost the whole of the sugar required for its consumption, of a yearly value of about £ 20,000;000 (2). This explains the campaign for the introduction in England of the cultivation of the sugar beet. United Kingdom

(1) Cf. this *Bulletin*, Jannary 1911, Abstr. 118. (*Ed.*).

(2) The value of the sugar imported into the United Kingdom was:

1908	£ 20,003,472
1909	£ 21,691,894
1910	£ 24,579,489

The consumption per inhabitant was calculated in 1909 at 79,55 lbs. *The Statesman's Yearbook for 1911*, p. 78, 80. (*Ed.*),

The present movement arose as a consequence of a series of experiments of sugar-beet growing in Norfolk and Lancashire. These trials were suggested to the farmers in those counties by the offers of Dutch refiners, who were anxious to procure their raw material in Great Britain.

The Central Chamber of Agriculture, which has its office in London, thereupon decided to create a National Council (National Sugar Beet Council).

The financial and industrial combinations formed at the present time are: The East Anglia Sugar Company Ltd., the Beet Sugar Development Company of England Ltd., The Beet Sugar Founders Ltd., and The Middlesex and Buckinghamshire Beet Sugar Syndicate Ltd.

The following are the results obtained in the different counties:

	Grade of Sugar %	Yield per acre tons
Berkshire	17.0	14 ½
Cornwall	17.3	26 ½
Essex.	18.7	14 ¾
Gloucester. . . .	17.1	14 ¾
Kent	17.1	15 ¼
Middlesex	17.7	16 ¾
Somerset	18.3	15 ¾
Suffolk	19.1	13

2898 **Sugar Production in the United States** (1). — *The Rural Californian*, No. 7, pp. 195-197. Los Angeles, July 1911.

The increase in the number of sugar factories in the United States has been rapid, the country now showing 63 in operation, which in 1908 and 1909 handled 3 658 621 tons of beets from which there was a total output of 421 244 tons of sugar, while the cane sugar produced in the United States amounted only to 300 000 tons.

United States

There is in the United States a consumption of 3 500 000 tons annually; so that there is apparently room for doubling several times the production before this demand is met.

Another indication of the possibilities before the United States is the fact that in Europe there are more than 1 300 factories which are turning out over 7 000 000 tons of sugar. Plainly the United States needs awakening to the opportunities before it. For-

(1) See Abstract 1864, this *Bull*, June 1911.

tunately in this line California is in the front. In another point the United States has room for improvement. This is in tonnage production. Germany is producing to-day an average of 10.9 tons of beets per acre; France 10.8; Austria 9.7; Belgium 12.5 tons, with average tonnage for all countries of 11 tons. (1) Now the United States is producing an average of 8.1 tons to the acre. Again, California leads, for its production is materially above that figure.

The sugar content in the United States is low, for in Germany the average is 17.5 per cent; other European countries somewhat less, while the United States shows an average of 12.6.

There were 8 factories in operation in California last year: with the additional factories to operate this year, it is estimated that California will be in the first rank as a sugar producing State. Last year it had a total slicing capacity of 10 500 tons, while Colorado had a capacity of 12 200 tons. The only other large sugar producing state is Michigan.

The Sugar Making Industry in India, — *Tropical Agriculturist*- Vol. XXXVII, No. 1, p. 40, Colombo, July 1911. 2899

India is the greatest cane-sugar producing country in the world (2) and sugar cane is particularly well-suited to the country, but, not- British India

(1) For these figures see above, Abstr. 2601. (*Ed.*)

(2) The following table, taken from the *Statesman's Year Book for 1911*; p. 137, shows the total acreage under Sugar cane in India in 1908-06.

Provinces	Sugar Cane	
	Acres	Hectares
Upper Burma	2 065	834.3
Lower Burma	10 102	4 081.2
Assam	38 352	15 494.2
Eastern Bengal	139 700	56 438.8
Bengal	368 400	148 833.6
Agra	918 717	371 161.7
Oudh	201 353	81 346.6
Ajmer Merwara	266	107.5
Parganá Mánpur	33	13.3
Panjab	368 636	148 928.9
N.-W. Frontier	27 740	11 206.9
Sind	3 821	1 543.7
Bombay	63 428	25 624.9
Central Provs	18 556	7 496.6
Berár	2 691	1 087.2
Madras	90 195	36 438.8
Coorg	12	4.8
Total	2 254 067	910643.0

(*Ed.*).

withstanding these facts, its sugar market has been captured first by the beet sugar and later by cane sugar from Mauritius and Java. This condition of affairs has been brought about by the backward state of the Indian sugar-cane industry in the matter of machine appliances. It is estimated that with modern machinery and better organization of the industry, India could produce 50 per cent. more sugar.

The native mills are either the " Rolhu ", a mortar and pestle arrangement, in which the cane is bruised and pressed, or else wooden roller mills, of which there are two kinds, the " gundi " consisting of two, sometimes three, upright wooden rollers, and the " belna " used in the Punjab and made of two horizontal wooden rollers. These mills cost from 26 to 40 shillings. They are hard to work and do the pressing very ineffectually. In many parts of India these wooden mills are being replaced by the iron sugar mill. This improvement was only effected after the machines had been adapted to native requirements.

Most of the sugar produced in India is consumed in the form of " gur ", *i. e* , unrefined sugar (corresponding to the " Muscovado " of the West Indies). Although there are a few factories of considerable size, most Indian cane is grown and manufactured by small cultivators. Under there conditions the establishment of large central factories is hardly realisable, It being practically impossible to secure a concentration of sugar plantations around a factory.

About half the sugar cane produced in India is grown in the United Provinces.

2900 Fox (Attaché Brit. Cons. at Peking). **Sugar Industry in China.** — *The Board of Trade Journal,* No. 773, p. 595. London, Sept, 21, 1911.

The sugar cane is cultivated throughout south-western China, principally in the provinces of Szechuan, Kwangtung, Kwangsi and the island of Hainan. The principal distributing centres are Swatow, **China** Amoy, Canton, Hoihow, Wuchow and Nanning, the first named being by far the most important port of shipment for both brown and white sugars. In 1909 the total export of brown sugar amounted to 660 347 cwts. valued at £ 319 000. As regards white sugar, 277 518 cwts. were exported in 1909. The only sugar refineries using foreign machinery are situated in Hong-Kong. At Amoy a sugar refinery, to be supplied with American machinery, is in course of erection.

RENTIERS (Brit. Cons. at Tamsui). **Formosan Sugar Industry.** — *The Board of Trade Journal*, No. 770, pp. 425-426. London, Aug. 31, 1911. 2901

The total production of sugar in 1910 in Formosa amounted to 4 079 344 cwts. The area of land under sugar-cane in 1910 was 90 005 *Ko* (about 247 000 acres) an increase of 61 750 acres over 1909.

In November, 1910, it was announced that no more charters would, for the time being, be granted for the formation of sugar manufacturing companies, nor for the extension of existing mills, the object being to check the expected over-production of sugar in the island, in excess of the demands of Japan for direct consumption and for refining, pending the opening of foreign markets. Formosa

No period has been fixed for this limitation, which is, however, officially stated to be a temporary measure. The number of mills, either new mills or extensions of existing ones, opened for the 1911 season was seven, with a total crushing power of 6 500 tons a day.

A mill is also being erected near Taihoku for the purpose of manufacturing refined sugar.

In Central and Southern Formosa, owing to the dry winter, the tops of the canes, which are lopped off and planted when the cane is cut, have failed to take root satisfactorily, and next season's crop will probably in consequence be 25 per cent short.

The Sugar Industry of Peru. — *The Times, South American Supplement*, No. 12, p. 9. London, June 27, 1911 (1). 2902

Of all the manifestations of agricultural life in Peru the sugar industry is by far the most important, constituting as it does the principal part of the public wealth. There are at least 100 plantations which possess excellent modern machinery. The total production of sugar in 1910 was 195 000 tons, of which 30 000 tons were consumed in Peru and the remainder was exported, chiefly to European and American markets, Chili taking 60 000 tons. Peru

The area planted with sugar-cane in Peru is calculated to be 173 000 acres and 20 000 labourers are employed in this industry. (2)

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(1) See this *Bulletin*: Dec. 1910, p. 328 (Ed.).

(2) The area available for the production of sugar in Peru is about 200 000 acres (80 800 hectares) half of which is planted with sugar-cane. See *Statesman's Year Book for 1911* p. 1105. (*Ed.*).

As types of the greater and more advanced enterprises may be mentioned the Roma plantation in the Chicama Valley.

Throughout Peru, sugar is cultivated; in the deep valleys of the Andean region it is grown chiefly for the purpose of rum.

To develop her economic progress Peru needs an agricultural industry which shall be prosperous and lucrative, and this industry is undoubtedly cane-growing.

2903 **Sugar Imports and Exports in the United-States.** — *Journal des Fabricants de Suere*, No. 35, p. 1. Paris, 30 Août, 1911.

Viewing the constant growth of sugar consumption in the United States, and taking as a basis the average increase of 887,046 quintals (1) recorded during the period 1909-10, it may be anticipated
United States that within ten years that country will absorb about 39,454,500 quintals of sugar instead of 30,384 000 quintals as at present. For Cuba, Porto-Rico, Hawaii, the Philippines, and for the cane and beet sugar producers of the Union this forms a huge and safe market, the growing needs of which ensure the best prospects of development to its natural suppliers.

2904 Fenyvessy. **Influence of Certain Vegetable Proteins on Wheat Gluten.** (Ueber den Einfluss einiger vegetablischen Proteins auf Weizenkleber). — *Zeitsch. für Untersuchung der Nahrungs — und Genussmittel*, Bd. 21, Heft 11, pp. 658-662. Berlin, 1 Juin, 1911. — Abstr. in *The Analyst*, Vol. XXXVI. No. 425 p. 407, London, August, 1911.

A record of experiments regarding the effect of the addition of different vegetable proteins to wheat flour, the main object being to ascertain the influence of these substances on the physical pro-
Germany perties of the gluten of the flour. The addition of wheat gliadin in quantities varying from 5 to 20 per cent. of the weight of the flour, increased the weight and baking qualities of the gluten; glutenin also increased the weight of the gluten, but diminished its baking quality. These experiments confirm the statement that the quality of a gluten depends on its composition. Gliadin prepared from rye flour acted in the same way as that obtained from wheat. The fact that rye flour itself does not yield a coherent cake of

(1) 1 Quintal = 100 kgs. = 220.46 lbs. (*Ed.*).

gluten is due, in the writer's opinion, to the presence of substances other than glutenin in this flour. Hordein prepared from barley decreases the baking quality of wheat flour, whilst zëin obtained from maize corn has no appreciable effect.

A. E. Humphries. **Some Points Concerning the Treatment of Wheaten Flour**. — *The Chemical News*. Vol. 104, No. 2702, p. 117. London, September 8, 1911. 2905

At the Leicester and Winnipeg meetings of the British Association the writer dealt with some phases of the complex questions concerning the quality of wheaten flour. Great importance must be attached to "strength", a flour's capacity for making big, shapely, and therefore well-aërated loaves. The nice appearance of food is a factor affecting its dietetic value, The whiteness of bread depends to a very great extent upon the "strength" of the flour used, and the good appearance of bread depends very largely on the perfect aëration of the loaf. "Strength" does not depend upon any one factor. A flour with a high protein-content is probably, but not necessarily, weak. Great Britain

The size of the loaf depends upon the production of sufficient gas during fermentation, more particularly during the later stages, and upon the gas-retaining capacity of the dough. The yeast must have a sufficiency of sugar, nitrogenous and mineral foods, in forms which it can assimilate. Flour itself does not contain sufficient sugar for the requirements of the yeast. As a general proposition, it is true to say that flour made from wheats harvested in moist atmospheric conditions yields, as a result of diastasic action during panary fermentation, a sufficient quantity of sugar; while those harvested in hot dry conditions do not. The yeast requires its nitrogeneous food in a very simple form. Flours containing a very high percentage of nitrogenous matter do not necessarily provide a sufficiency of nitrogenous yeast-food. It is believed that yeast can obtain all the mineral matter it requires from flour, but there are cases in which the addition of mineral phosphates does increase the yield of gas in panary fermentation conducted under commercial conditions. A flour may possess a high percentage of gluten, but unless it yields in fermentation sufficient gas to overcome the great and variable leakage and thoroughly to inflate the dough in the latest stages of the breadmaking process, it would be accounted weak.

Furthermore, a flour may yield more than sufficient gas at all stages of fermentation, and may even possess a high percentage of

nitrogenous matter and yet produce very small loaves. Dr. Hardy, at the Winnipeg meeting of this Association, showed that gluten loses its tenacity and ductility if it be deprived of its electrolytes. Prof. T. B. Wood has demonstrated the profound influence which very dilute solutions of acids, alkalis, and salts have on the physical characteristics of gluten. It has been found that additions of very small percentages of *salts natural to flour* or *wheaten ash* do increase the size of the loaf, even though the production of gas in fermentation be unaffected or actually diminished.

British millers nowadays obtain their raw material from all parts of the world, a multitude of varieties raised in an environment ranging from arctic or semi-arctic to tropical or semi-tropical. The climatic conditions in most districts also vary greatly from season to season. From such extremely diverse and variable materials, they have to produce flours of uniform qualities. It is therefore right and proper that they should be allowed to make use of the advances in chemical knowledge in the treatment of wheats and flours. Sometimes the desirable treatment can be limited to the adjustment of the water content, Nature herself being thereby enabled to effect the necessary changes.

Sometimes the addition of water fails to bring about these changes, or for various reasons it is undesirable to raise the water content sufficiently, and in such cases the addition of diastatic bodies, nitrogenous yeast-foods, and salts natural to wheat or wheaten ash is desirable, and should be permitted. But inasmuch as such permission might be abused, a Board of Reference consisting of highly qualified physiologists, chemists, and business men should be established, to whom all such processes and additions should be submitted, and to whom millers and bakers should be made responsible.

2906 R. W. Thatcher, G. A. Olson and W. L. Hadlock. **Wheat and Flour Investigations.** See above, Abstract No. 2542.

2907 William Jago and William C. Jago, **The Technology of Bread-making, Including the Chemistry and Analytical and Practical Testing of Wheat, Flour, and other Materials employed in Bread-making and Confectionery.** — Simpkin, Marshall & Co. Ltd. London (Abs. *The Chemist and Druggist*, Vol. LXXIX, No. 1, 653, p. 62. London, September, 30, 1911.

Great Britain

The earlier edition of this work appeared many years ago, and in the interval, Mr Jago's book has established itself as the authority

on the scientific aspect of bread-making. The present edition, in the preparation of which Mr Jago was assisted by his son, has been enlarged to over 900 pages, this being rendered necessary by the advances that have been made in recent years in the science of panification.

E. KAYSER and A. DELAVAL. **The Study of Viscous Bread.** — *Comptes rendus de l'Académie des Sciences*, Tome 153, No. 12, pp. 577-578. Paris, 18 Septembre, 1911. **2908**

Bread which has grown viscous has already been the subject of many investigations owing to the considerable losses it causes to bakers. The deterioration is due to the action of bacilli belonging to the genus *Mesentericus*, the spores of which possess great powers of resistance to physical and chemical agents. **France**

Laurent, Uffelmann, Kretschner, Vogel Fuhrmann and others have dealt with bacteria of this kind. The authors had occasion to isolate a species from a Paris crumb bread, which is extensively used in tea-rooms and at fashionable receptions.

These bacteria prefer maltose as sugar; but they invert saccharose and lactose. Asparagin, and above all peptone are their favorite nitrogenous foods.

In the full loaf, the bacterium attacks both starch and nitrogenous substances, yielding as products: ethyl-alcohol, acetic acid, valerianic acid, acetylmethylcarbinol already recorded by M. Grimbert for the *Bac. tartaricus*, and lastly, products of degradation of the nitrogenous substance. The final reaction is sometimes acid, sometimes ammoniacal.

The authors were able to carry out various bread-making tests at the Syndicat de la Boulangerie Parisienne (Paris Bread Makers' Syndicate). The experiments were to ascertain the influence of the following: length of baking, and size of loaf; acidity of the dough obtained by adding variable doses of a lactic culture, curdled milk, or a solution of commercial lactic acid; finally, the temperature at which the bread was kept.

These tests showed that the addition of lactic acid (1.9 to 2 grammes (1) per kilogramme of dough; if previously dissolved in water, its uniform distribution throughout the dough will be faci-

(1) 1 gramme = 0.0352 oz (Avoir.).
1 kg. = 2.2046 lbs.

litated) was sufficient after baking for 30 minutes to prevent the germination of the spores in 250 gramme and 500 gramme loaves. Baking for 45 minutes had the same effect with a 1 000 gramme loaf, even when the bread was afterwards kept at 25° C. (77° Fahr.) These results were confirmed by tests on a large scale carried out in bakeries.

The bacterium originates chiefly from the flour. The baking temperature, and that at which the bread is afterwards kept, influence its multiplication. The severe epidemic which raged this year in some bakeries in Paris, and the department of the Nord, may be explained by badly kept flour, which was richer in bacteria (the year 1910 having been abnormal), by the use of defective yeast, and by the unusual temperatures of 1911. In these cases washing of the utensils with boiling acidulated water, the utmost cleanliness, and storing the bread at low temperatures are useful. Loaves made with strong leaven are much less liable to this deterioration than those manufactured with yeast only.

2909 CLIVE BAYLEY (Brit. Cons. at Warsaw). **Production and Exports of Potato Starch from Poland.** — *The Board of Trade Journal*, No. 771, pp. 496-497. London, Sept. 7th, 1911.

The manufacture of potato starch in Poland has steadily increased. At the end of 1910 there were 51 factories engaged in **Poland** this trade. and the export for the year in estimated at 1 200 000 pouds (about 19 200 tons). The export price varied between 1 rouble 5 kopecks and 1 rouble 35 copecks per poud (2*s.* 2 ¼ *d.* and 2*s.* 10 ½ *d.* per poud (36 lbs English).

There is a direct trade in this article with the United Kingdom, which was considerably developed in 1910.

The demand for jute sacks used in the transport of the starch is increasing.

2910 **Megass and Bamboo Paper in Trinidad.** — *Journal of the Royal Society of Arts*. Vol XIX, No. 3067, p. 974. London, September 1, 1911.

After much experimenting in Trinidad, it is claimed that paper from megass (sugar-cane refuse) has been successfully manufactured, **Trinidad** and that with further possible development, the refuse of the cane, now used only for fuel, may be used in connection with bamboo

fibre in the manufacture of a paper which, in quality and price, can command the market against any wood paper now thereon. The quality of the paper is obtained by combining the two fibres. Neither the cane fibre nor that of the bamboo, used alone, will produce this paper. The proper combination of the two under conditions in which the experiments have been carried on, will alone give the desired result. The fibre of the bamboo is long and coarse, while that of the cane is short and soft, and in their combination the happy medium is said to have been found. It is said that no chemicals have been used in making the paper, and the difference in colour is produced by the addition of a little pigment to give the shade desired. The bamboo grows in large quantity in Trinidad, and the extent of the sugar industry is such that there would be no lack of the raw material. (1)

The Artificial Silk Industry in Poland and Russia. — *Bulletin des soies et des soieries*, No. 1781, P. 7, Lyon, 24 Juin, 1911. **2911**

A factory for the production of artificial silk is now being erected at Tomaschund, Poland, and a company has been formed for the erection of a similar factory in the district of Sachatschew. If these two new Polish factories fully utilise their capacity of output, which is estimated at 35 000 poods per annum (1 260 000 lbs.) and if the quantity produced by the factory near Moscow be valued at about 8 000 poods (288 000 lbs.), the Russian output of artificial silks would amout to about one-fourth of the consumption of silk in Russia. **Russia: Poland**

The Manufacture of Jippi-Jappa Hats in Jamaica. *Journal of the Royal Society of Arts.* No. 3012. pp. 898-899. London, July 18-1911. **2912**

What are generally known as Panama hats are not made in Panama at all, but chiefly in south America, especially in Colombia and Ecuador, and to some extent in several Central American States. All grades of these hats are made from the leaves of a palm plant (*Carludovica palmata*) called locally Jippi-Jappa (2). The plant from which hats are made in Jamaica is said to be exactly the **Jamaica**

(1) See pp. 257 and 331 of *Bulletin* for December 1910 (*Ed.*).

(2) It belongs to the order of the Cyclantheae, found only in tropical America; this species comes from Peru. BAILEY, *Cyclopedia of American Horticulture*, Vol. I, p. 247.

same as that used in Ecuador, but by others it is called *Carludovica Jamaicensis*). The tree is a bushy palm growing in clusters along rivers and in damp places. The best of the Jamaica hats can scarcely be distinguished from the so-called *Panama* hats and their wearing quality is very good. There are no statistics to show the number of hats manufactured annually, but is is estimated to be between 50 000 and 100 000. This number could be largely increased, as besides the regular makers there are 460 girls who have recently been tanght the art in the schools provided by the Agricultural Society of Jamaica.

2913 **The Broom Industry of Honduras** (1). — *Journal of the Royal Society of Arts*. Vol. LIX, No. 3068, p. 987-988. London, Sept. 8, 1911.

In the district of Santa Barbara and Islama in Honduras, there has for many years been carried on, in a small way, and as a by-product of the manufacture of panama hats, a broom industry which is now beginning to attract attention. The panama hats are made **Honduras** from the fibre of the *Carludovica palmata*, the young shoots of which are cut just as they begin to flower. The fibre grows in concentric folds around a central stalk. It is peeled off for the hat-makers according to the fineness desired, dried in the sun, and bleached with sulphur.

The young shoots are from two to three feet long, and when the outside fibre is stripped off, there is left a central stalk or core, which is split, flattened out, and cut into strips for making brooms. The strips are divided into lengths of ten to fifteen inches, which are firmly tied in the centre around a broom-handle, doubled back, tied again and trimmed to the desired length and shape, and placed on the market by sending out mule-loads to the various cities and towns.

The fibre has a good spring in it and is said to be very durable. It is proposed to ship the fibre in bulk to broom-makers in the United States for domestic and business purposes.

2914 **Matches from Grass and Straw**. — *Scientific American*, Vol. CV, No. 11, p. 233. New York, September 9, 1911.

A London paper mentions a process, said to be in the experimental stage, for manufacturing from dried grass or straw, a wood **Great Britain: England**

(1) See above, Abstr. 2408. (Ed.).

substitute which is primarily intended for use in the manufacture of matches. At the conclusion of the process, which is described as including crushing and stripping the straw, and compressing a flat layer between sheets of paper, and subsequently moulding the splints, the latter are cut to length and dipped in the match composition. When the scarcity of wood in Great Britain renders desirable the use of a substitute in match-making, a fruitful field will be opened to inventors.

HENRI BLIN. **Industrial Utilisation of Maize Stalks.** — *La Nature*, No. 1909, p. 125. Paris, 16 Septembre 1911. 2915

Independently of the grain and the green stalk it supplies for the food of man and animals, maize is adapted for various industrial uses which are highly interesting and comparatively little known. The pith of the stalk is used in the United States Navy instead of that of the cocoa-nut tree for certain peculiar purposes, such as lining the hull of ships, and manufacturing explosives. United States

The stalks left after picking are a very valuable fuel, (white coal) in fertile plains without forests, and sell at about 30 centimes per hectolitre (3*d*. per 2.75 bush.). From this a new industrial use arises, operating upon maize cobs when the grain has been removed. The idea is due to an American chemist, Russel Couth ; who seeing the large quantities of cobs destroyed by burning, because they were deemed useless and in the way, was struck by the enormous quantity of gas given off. Mr. Russel Couth was the prime mover in the formation of a company with a view to carrying out experiments.

This American chemist, taking for his guidance the methods used in producing lighting gas, charged retorts with straw and maize cobs, and heated them with maize coke, which seems perfectly able to take the place of gasworks coke for this purpose. The maize coke is formed in the retort in the proportion of about 30 % of the cobs operated on. The gas obtained by distillation in a closed vessel is purified by washing, and stored in bell holders. This gas has a heating power of 5 870 thermal units per cubic metre (1.31 cub. yd), *i. e.* as much as, or more than ordinary lighting gas. With regard to its cost price, Mr. Russel Couth found it low enough to enable the producers to sell it at 8.7 centimes per cubic metre, in all parts of the United States where there is an abundant maize crop, that is, where the raw material is plentiful, and this price leaves the producers the necessary ample profit. It is anticipated that maize gas will compete keenly with the petroleum which farms

in the New World require for the motors of their agricultural machines. American industry will then find a new fuel at its disposal and a cheap one, owing to its low cost price, the abundance of the raw material, and the high heating power.

This new industry is the more interesting and may assume the greater importance inasmuch as the maize-growing belt is very extensive, and the production of this cereal has attained immense importance in the agriculture of the Union, where it comes immediately after wheat, especially in the plains extending from Lake Erie to the western terraces of the Alleghany mountains, towards the South-east, the steppes of Texas to the South-west; and the plateaus of Kansas and Nebraska towards the West.

The temperate regions and cold lands of Mexico, the agricultural zone of Chile, the plains of North-West Argentina, Uruguay and the Brazilian plateau, as well as Australia, Natal, Egypt, Turkey in Asia, Southern Russia, (chiefly Bessarabia); likewise Venetia, Lombardy, Tuscany, the Valley of the Ebro, South-eastern Spain, the plains of Andalusia and Portugal, tropical Africa; the Congo, the Lake region, Abyssinia and the Soudan bordering the ocean; Indo-China and some points in Malasia; and lastly Algeria, Tunisia and the South of France; are all engaged in maize culture.

2916 Sir William A. Tilden. **The Chemical History of the Terpenes. A Chapter in Modern Synthetical Chemistry.** — *Science Progress in the Twentieth Century.* Vol. VI, No. 21, p. 60, London, July 1911.

Great Britain

The action of heat on the terpenes, long ago studied by Bouchardat, Berthelot and other chemists, has led to results which have become of some practical interest within recent years in connection with the efforts which are being made to produce caoutchouc or rubber artificially.

When pinene is heated to about 250° C. (482° Fahr.) its rotatory power is reduced and ultimately destroyed, a part of the hydrocarbon being converted into dipentene and part into products of polymerisation. If the vapour of pinene, limonene or dipentene is heated to a temperature of about 400° C. (752° Fahr.) it is partly resolved into a pentene, $C_5 H_8$ which is identical with one of the products of the action of heat on indiarubber and is known as isoprene. It has been recognised by Mokiewsky (Chem. Centr, 1899, i. 589) as 2 methylerotonylene $CH_2 = CH - CMe = CH_2$.

Isoprene heated alone in a sealed tube is converted into dipentene mixed with viscous products of its polymerisation. But if it is kept for some months or a year under conditions which, except exclusion of air, have not been exactly determined, it passes spontaneously into a syrupy liquid which gradually deposits solid masses of rubber. Rubber is also formed when isoprene is heated with small quantities of acetic and other acids. This observation, made more than twenty years ago, has led to various attempts to employ isoprene as a practical source of rubber on a manufacturing scale.

When rubber or gutta-percha is destructively distilled, it yields a mixture of hydrocarbons from which can be separated as chief products, isoprene and dipentene, originally called, caoutchine. It would appear from this that rubber is a compound, the formula of which is either $(C_{10}H_{16})_n$ or $(C_5H_8)_n$.

Otto of Roses. — *The Chemist and Druggist*, Vol. LXXIX, No. 1648, p. 46. London, 26 August 1911. **2917**

The examination of a few samples of new-crop Bulgarian otto of roses of undoubted purity has given the following characters: **Bulgaria**

Specific gravity at 30°	0.855 to 0.858
Optical rotation	−3° to −3° 45'
Refractive index at 20°	1.4620 to 1.4640
Melting-point	21° to 22.5°
Ethyl alcohol	Absent
Total alcohols, as geraniol	74 to 77 per cent.

According to reports from confidential quarters, there are several new adulterants being used this year, the nature of which is at present quite unknown.

BLIN. **Fruit and Vegetable Drying in Germany.** — *L'Agriculture Commerciale*, No. 12, P. 305. Paris, 25 Juin 1911. **2918**

The German farmer is so thoroughly alive to the advantage attached to drying fruit and vegetables, that he conveys his products and by-products to the drying works, and makes successful use of them for feeding working animals, and for fattening. The products of this rural industry have extensive markets in Sweden, Norway, Scotland and Finland. **Germany**

Exportation has contributed largely to generalising the practice of drying vegetable products in Germany, where there are conse-

quently immense reserves of food. In all large towns dried fruits and vegetables are to be found.

German farmers dry almost all their vegetable products, (brewer's grains, pulp, beetroots, potatoes, and their vines, carrots, cabbages, green summer fodder, lucerne, clover, sainfoin, cereals, vegetables, fruits, haricot and pea vines); they often utilise these latter as dry fodder, or as a mixture in soups and mashes prepared for cattle.

They have formed unions for the purchase of drying plant, the members taking their turn in treating their crops.

2919 **Fruit Drying in the Tyrol and California.** — *Revue Scientifique*, 49e Année, No. 7. 2e Sem. P. 211. Paris, 12 Août 1911.

The Tyrol is becoming a centre for the production of dried fruits; this industry is chiefly established at Botzen, Meran and Wintschgau near Innsbruck.

Austria: Tyrol

The drying of grapes, plums and figs brings down the water content to about 30 per cent.

United States: California

The fruits dry quicker the riper they are. Small fruits, when equally ripe, dry quicker than big ones, but always yield a less agreeable " paste ".

The oxydase of pears or apples gives rise to injurious colouring, and therefore blanching with sulphur dioxide or steeping in hot water (10 grammes per litre) is resorted to.

California exports huge quantities of dried fruits. In 1910 there were exported 22 000 tons of dried peaches, 15 000 tons of apricots, 27 000 tons of apples, 900 tons of pears and 2 200 tons of figs.

The production increases one tenth every year. On the other hand, that of raisins (55 000 tons) and prunes has declined. The latter is still 30 000 tons. The prices are calculated on the basis of 80 prunes to the pound.

2920 **Plum Drying in France.** — *Revue Scientifique*, 49e Année. 2e Sem., N. 8, Pp. 243-244. Paris, 19 Aout 1911.

In France alone 20 to 30 million francs worth of plums are dried every year. This indicates the importance of the industry.

France: Lot-et-garonne

The selection of drying stoves is a question of great interest. In Lot-et-Garonne comparative experiments were held in 1861, 1872, 1879 and 1896. Last year, Villeneuve-sur-Lot organised another competition, in which ten systems were tried.

These appliances are in the main formed of drying stoves of the shape of a parallelopiped, heated inside and out. The plums are placed on hurdles arranged on trucks. The dimensions are about two metres each way. The heating is always by hot air ; as wood is getting dearer and dearer, efforts are being made to prevent losses of heat by double walls and pipes. A turning base arrangement allows of continuous drying.

Together with these stationary appliances there are being designed portable evaporators, consisting of superposed hurdles, which can be placed on any stove.

The operation in the drying stoves consists of three parts :

1. Preliminary drying " fletrissage " by the rapid action of air at 100° C., (212° Fahr.) which is lowered to 55° C., (131° F.) during several hours.

2. The fruit is brought out into the open air for hardening, and afterwards goes through the next stage " secondage " at a temperature of 85° C., (185° F.) which falls to 60° (140° F.) in 5 hours. It is then raised to 70° (158° F.) for one hour.

3. The fruit is again brought out into the open air, then replaced and put through the last stage « finissage », at a temperature of 100° C. (212° F.) ; this time the windows of the stove are opened to prevent the condensation of moisture. The operation lasts another 5 or 6 hours, and ends at the temperature of 75° (167° F.).

The drying stoves tested at Villeneuve-sur-Lot took a weight of 300 to 500 kilogrammes (1) of fresh plums, which they dried in two charges lasting together 40 to 50 hours. There were consumed 350 to 380 kilogrammes of wood per 100 kg. of prunes. There were required 135 to 240 kilogrammes to evaporate 100 kilogrammes of water. Each stove produced 65 to 90 kilogrammes of dried prunes per 24 hours.

In comparison with the weight of the fresh plums operated on, the product showed a proportion of 35 to 39 per cent. These figures are a little below the average (40 per cent), the 1910 fruits having been particularly moist.

Besides the cost of labour and fuel, account must be taken of the rapidity of operation, which is important in years of plenty, or of unfavorable keeping conditions.

Account must also be taken of the quality of the prunes, which is determined by factors concerning :

1. The colour and gloss of the skin ;

(1) 1 kg. = 2.2046 lbs.

2. The uniform drying of an entire stove charge;
3. The strength and dryness of the skin to the touch;
4. The degree of cooking of the pulp and kernel;
5. The number of fruits per pound of 500 grammes, minimum 40;
6. The taste of the fruits.

2921 Q. TRUELLE. **Preservation of Table Apples and Pears in Peat.** — *L'Agriculture commerciale*, No. 17, pp. 468-469. Paris, 1er septembre, 1911.

In the experimental station of the Royal Institute of Geisenheim on the Rhine, two sets of experiments were carried out with peat from the upper part of the peat moors; it was quite free from odour, very dry and very fine, having been screened.

Germany From the tests it was found:

1. That the use of peat is a good method of preserving certain varieties, particularly those maturing late;
2. That it appears more advantageous for apples than for pears;
3. These advantages are the more certain, the earlier the fruits are dealt with after they have been gathered, with as little handling as possible.

The fruit grower therefore has every reason to make use of this method, guided by the above data, and using only very select fruits, restricting the time of keeping them to what is necessary for disposing of them to the best advantage.

2922 **Fruit Bottling for Small Holders.** (1) — *Board of Agriculture and Fisheries*, Leaflet No. 250. p. 9. London, May, 1911.

The bottles filled with fruit and water or syrup are to be placed in the boiler or steriliser aud the temperature raised quite slowly, perhaps at a rate of 2° F. (1°,1 C.) per minute.

Great Britain A lower temperature than 165° F. (73°.9 C.) is quite unreliable, and a higher temperature than 190° F. (87°.77 C.) or 200° F. (93°.33 C.) is unnecessary. The temperature at which fruits are bottled will in part depend on the period for which such temperature is to be maintained.

(1) See The *Science and Practice of Farming during* 1910 *in great Britain*, p. 305. Internat. Inst. of Agriculture. Rome 1910. (*Ed.*)

One authority states that the temperature should be maintained for 15 or 20 minutes at about 165° F. in the case of small fruits such as gooseberries, currants, cherries, and raspberries, and at any temperature between 165° and 190° F. (75°.9 C. and 87°.77 C.) in the case of plums, apricots, peaches and pears. For sterilising the latter fruits 40 minutes at a temperature of about 165° F. to 170° F. (73°.9 C. to 76°.66 C.) will answer.

The following table of approximate temperatures is given :

	Temperature Fahrenheit	Centigrade	Length of time to maintain the maximum temperature. Minutes	
Gooseberries	140-150	60-65.5	30-45	
Red Currants	140-150	60-65.5	20-30	
Raspberries	140-150	60-65.5	20	
Black currants	150-160	65,5-71.1	30-45	(These may be treated a second time).
Plums	150-160	65,5-71.1	30-45	
Apricots	160-180	71,1-82.2	45	
Peaches	160-170	71,1-76.7	45	
Tomatoes	170-180	76.7-82.2	30	(Treat twice).
Gooseberries, Currants, Cherries, Raspherries	165	73.9	15-20	
Plums, Apricots, Peaches, Pears	165-190 or 165-170	75,9-87.8 or 73,9-76.7	15-20 / 40	

The necessary temperature and the length of time to maintain the maximum temperature, vary somewhat with the ripeness of the fruit.

German Regulations on Fruit Preserves. (Verband von Nahrungsmittel-Interessenten, Sitz Leipzig). — *Konserven Zeitung*, 12. J., No. 18, p. 260. Braunschweig, 5. Mai 1911. See also *Boll. del Ministero di Agr. Ind. e Comm.* Serie II, Fasc. I, p. 17. Roma, 1 Luglio, 1911. **2923**

German manufacturers of fruit preserves, and persons interested in that industry have, at a meeting held in Leipzig, just drawn up an application which they will present to the Bundesrath, for measures to be taken with a view to organising and regulating the manufacture of fruit preserves, and the introduction of such preserves from abroad. **Germany**

The producers demand that the Federal Government should follow the example of Austria and Switzerland, who have already published special laws regulating the manufacture of, and trade in marmalades, syrups, wines, preserves, etc.

2924 A. V. Stubenrauch and S. J. Dennis, **The Precooling of Fruit.** *Yearbook of the U. S. Dep. of Agriculture for* 1910, pp. 437-448. Washington 1911.

This paper gives a concise account of the progress and results of the investigations made by the U. S. Bureau of Plant Industry with regard to the process of fruit precooling viewed from the commercial stand point.

United States

The term precooling has been applied to the rapid cooling of fruit or other produce before it is shipped or stored. Ice and salt or mechanical refrigeration are usually employed. The object of precooling is to reduce the temperature of the fruit as quickly as possible to a point where ripening is retarded and decay prevented.

Many problems connected with the rapid reduction of the temperature of fruit remain to be solved. It is not yet certain what system of cooling is preferable, whether the cooling should be accomplished before, or after, the fruit is loaded in the cars. Careful study of all phases of the subject, and a long series of tests will be required before the problems are fully solved.

Nevertheless precooling of fruit has already received commercial application and a number of plants have been erected and are in operation in California, and many more are projected in various parts of the United States. Some of these plants, operated by associations of growers or shippers, precool the fruit before it is loaded; some, constructed by trasportation companies and operated in connection with the refrigerator-car service, are car-cooling plants and accomplish the precooling after the fruit has been delivered to the railroads.

Though the ideal system of precooling has not yet been found, its importance as a means of promoting the safe transportation of fruits for great distances has long been fully recognised and its use will be extended as rapidly as the principles can be worked out and applied. The great advantage of precooling is that it renders unecessary the packing of such fruit as peaches, plums, and apricots in a hard, green condition. It also reduces the differences frequently occurring between the top and bottom tiers within the car by equalizing the temperature.

J. A. Ruddick. **The Pre-Cooling of Fruit.** *The Canadian Horticulturist.* Peterboro, Canada. Vol. 34, No. 9, September 1911. pp. 205-206. **2925**

Pre-cooling is a term applied to any method of cooling or chilling before shipment. The cooling may be done in the packing house or deferred until the cases or baskets of fruit are placed in the car. The latter is said to posses some advantages over the former. The pre-cooling in cars is described. **Canada**

As early as possible after the cars are loaded, they are brought to the refrigerating plant and connected with the system by means of flexible pipes which provide for the passage of a current of cold air through the car. The pipe is attached to a false door which exactly fits the doorway. Outlets or suction pipes are fitted in the same manner into one of the hatches of the ice bunker at each end of the car. Fans are used on both the inlet and returns to promote a rapid circulation of the cold air. Canvas baffles are hung temporaily in the car to deflect the air between the packages.

With sufficient refrigerating power, three or more cars may be simultaneously cooled in four or five hours, including the time required for connecting and disconnecting the air pipes, and filling the bunkers with ice.

While the heat is still in the fruit it is safe to employ temperature below the freezing point. A pre-cooled car will carry very much farther without being re-iced than one started with warm contents. For early, quick-ripening apples and tender fruits the advantages of pre-cooling are very great, (1).

Dr. Repin. **The New Camphor and Sulphurous Acid Refrigerator** — *Revue Générale du Froid*, 3e année. Tome III, No. 5 (No. 24). Pp. 214-233. Paris, Mai, 1911. **2926**

Dr Répin, of the Institut Pasteur in Paris, has designed a refrigerating machine in which advantage is taken of the affinity of sulphur dioxide for camphor, and the water-ammonia combination of Carré's classical machine is replaced by the combination camphor-sulphur dioxide. Camphor, in the open air, will dissolve 30 % of its weight of sulphur dioxide, and the mixture appears in the form of a yellowish liquid, perfectly stable, which only needs **France**

(1) See, Abstr. 957 *Bull.* March. 1911, and above, Abstr. 2924. (Ed.).

heating to about 100° C. (212° Fahr.) for these two constituents to separate. As camphor only boils at 204° C. (399.2° Fahr.), no distilling over need be feared; on the other hand the camphor mixed with naphtol remains liquid even after the sulphur dioxide has separated.

The first application Dr Répin made of this principle was the construction of a refrigerator, consisting of three parts, a reservoir, a cold producer and an absorber.

The reservoir is a steel bottle, with a capacity of 50 litres; containing 20 litres of liquid sulphur dioxide. The producer is a wooden box lined inside with insulating substance, and containing a cylindrical liquid-air vessel, which encloses a nickelled copper cylinder, closed at the bottom, and intersected by a transverse partition, so that its upper part forms the cold chamber of the refrigerator.

The absorber is an iron boiler tested to 12 atmospheres, and containing 150 kg. (330 lbs.) of a mixture of 75 % of camphor and 35 % of naphtol.

The sulphurous acid vaporised in the producer passes into the absorber, where it is taken up by the camphor; until the latter has reached saturation point the temperature of the cold chamber remains about 8° C. (46.4° Fahr.).

The applications of these little cooling machines are numerous, and the appliance is most thoroughly adapted for the preservation of vaccine, especially for laboratories in hot countries.

M. Répin has also constructed a small machine for home manufacture of ice.

2927 J. S. Macdonald. **Assimilation of Protein in Vegetarian Diet. Enquiries into Dietaries in Bengal** (1). (Diet and Development). — *Nature*, Vol. 86, p. 228. April 13, 1911.

British India: Bengal

The principal impression left by the reading of this report on the dietaries of prisoners condemned to penal servitude in Bengal, is that the Government of India now has in its possession an opi-

(1) « *Investigations on Bengal Jail Dietaries with some Observations on the Influence of Dietary on the Physical Development and Well-being of the People of Bengal* ». By Capt. D. Mac Cay, pp. IV + 226 + 15 Charts. (Calcutta Government Printing Office, 1910). In *Scientific Memoirs* by Officers of the Medical and Sanitary Department of the Government of India, New Series, No. 37.

See this *Bulletin*, p. 145, November 1910. (*Ed.*).

nion based on well-organised and skilfully conducted enquiries for justifying the reduction of the excessive diet allowances of those prisoners. The author may be said to have proved that their vegetarian diet, which is the ordinary diet of the native population, was so plentiful that most of the food was undigested. It would seem that before these enquiries, the dietaries were made up in such a way as to have the same value in protein as European diet. In order to make the food like that served in British prisons, meals of extraordinary bulk were supplied, when this diet was made up of native foods.

Now if this bulky food be added in small quantities to the varied constituents of a European meal, it will be found that 80 % of the protein content is assimilated; while the author has shown that only 50 % were utilised when they formed the principal constituents of a heavy meal, although these heavy meals are characteristic of the district.

The report deals also with the quantity of salts needed for these dietaries; the conclusion at which it arrives is that the quantity of salts supplied is excessive, and that this excess is harmful.

The author has carefully studied the changes which follow an increased assimilation of protein, and has supported his views by references to the habits of the different native races of India which he was enabled to observe.

Preparing Yeast for Human Food. — *Pure Products*, vol. VII, No. 8, New York, August 1911. **2928**

Now that the value of yeast as a rich source of nutriment for human beings has been recognized, definite steps looking towards commercial exploitation of yeast along this line are under way. The « Versuchs und Lehranstalt für Brauerei in Berlin » has perfected processes for removing bitter substances from yeast, and has secured for publication cookery books showing how to utilize yeast in preparing various articles of diet. **Germany**

Prof. Hayduck describes a method for transforming brewery yeast into concentrated human food. The general method of operation in a new establishment provided for this purpose, is as follows. The yeast is first collected in a vat provided with stirring apparatus from where, after sufficient dilution with water, it is pumped into the washing and settling vats. During this operation it passes through a finely meshed sieve, which retains all impurities, such as suspendend matter, hop resins, etc.

In the washing vat, the yeast is washed with water until the wash water no longer has a bitter taste. It is then returned to the stirring vat and debittered by treatment with sodium carbonate, after which it is pumped again into the washing vats, where the debittering process is finished by means of a thorough washing with water. After the debittered yeast has settled ont, it is run off into a small collecting vat, from which it passes to the drying apparatus. While the first batch of yeast is drying, a second batch can be put through the debittering process so that, the proccss in a certain sense can be regarded as continuous. Arrangements for cooling the stock of yeast, which is not being worked up, are provided,

The whole process of debittering and the operation of the drying apparatus are very simple and the necessary apparatus are contained in a room 33 feet long, about 22 feet wide and 26 feet high. Adjoining this room is a small room for storing the dried yeast, mills for grinding and apparatus for packing and pressing. Under normal conditions this plant will turn out 30 000 kilograms of yeast per year (66 000 pounds). As the dried yeast for food purposes has yet to win a place in the market, much will depend upon the standpoint assumed by the manufacturers in pushing its claims. Prof. Hayduck is of opinion that it should be offered on its own merits, as a concentrated food to be consumed along with other materials commonly taken at meals.

There exist at the present time a great number of concèntrated foods on the market which are sold at rather high prices.

Yeast, being a very nourishing food, should take its place alongside of these, and a corresponding price may be demanded for it. somewhat on a level with a price demanded for good beef of equivalent nutritive strength.

2929 C. HERMANN SENN. **How to Cook Vegetables**. (The Food and Cookery Publishing Agency, Westminster). — *The Gardeners' Chronicle*, Vol. L, No. 1291, p. 218. London, September 23, 1911.

Great Britain

Mr. C. Hermann Senn in his little volume entitled " How to Cook Vegetables ", is useful for the increasing number of people who prefer an entirely vegetarian diet. Perhaps it is to vegetarianism that are due the several slight improvements in cookery that have taken place of late.

SCOBELL, GRAHAM and HOLMS. **The Meat Packing Industry in Mexico**. See above, Abstr. No. 2405. 2930

Glycerine not to be Used in Food. — *La Nature*, 39e Année, 2e Sem., No. 1996, P. 98. Paris, 26 Août 1911. 2931

Glycerine being sweet, and viscous, some manufacturers in search of innovations have conceived the idea of using it for the making of syrups and jellies, and for the preparation of paste from which gum lozenges are made, as it prevents their getting hard, and also for making sparkling lemonade. Should this introduction into food be encouraged? The Minister of Agriculture consulted the Superior Council of Public Hygiene in France on the point, and the Council, upon a report by Professor Pouchet, decided in the negative. France

Glycerine, says the report, though it cannot be considered absolutely as a food, may nevertheless play a rather important accessory part in food stuffs, on condition that it be used only in small proportions and occasionally. Its constant elimination through the kidney and liver might be attended by drawbacks, as was shown by the experiments of Dujardin-Beaumetz and Audigé. To sum up, it is rather a medicine than a food. The use of glycerine therefore in the manufacture of beverages, jellies and sweets cannot be authorised.

The Use of Charlock as a Substitute for Mustard (1). — *United States Dept. of Agr., Food Inspection Decision* 137. Washington, June 24, 1911. 2932

It has come under the notice of the Board of Food and Drug Inspection that the seed of charlock (*Brassica arvensis* L.) is being substituted by some manufacturers in whole or in part, for that of the true mustards; viz., yellow or white mustard (*Sinapis alba* L. synonym. *Brassica alba* (L.) Boiss, brown mustard (*B. juncea* L.), and black mustard (*B. nigra* L.). United States

It has been decided by the Board of Food and Drug Inspection that when charlock is substituted in part for mustard the label should clearly indicate this fact; that a condiment prepared from mustard or mustard flour and charlock with salt, spices and vinegar is not « Prepared Mustard », but provided a greater quantity of mustard than of charlock is used it should be called " Prepared Mustard and Charlock ".

(1) For the adulterations of Mustard, see A. and M. WYNTER BLYTH, *Foods; Their Composition and Analysis*, sixth ed., pp. 489-491. London, 1909 (Ed.).

2933 A. GUTHRIE. **The Leather Industries of the Bombay Presidency.** (1) — *Bulletin of the Imperial Institute*, Vol. IX, No. 1, pp. 54-55, London, 1911.

From the report that has been recently made to the Bombay Government by Mr. A. Guthrie, as the result of a 6 months' investigation of leather manufactures in that Presidency, the following particulars are taken:

British India: Bombay

The raw material available for leather production in Bombay, as in the rest of India, consists chiefly of buffalo and cow hides, and the skins of sheep and goats, with small quantities of camel, sámbhur (2) and neilghai (3) skins. Lime is available in abundance in most parts of the Presidency, and the oils used for leather dressing are sesame, ground-nut or safflower, all of local origin. The tanning materials used are *Acacia arabica* bark («babul»), *Cassia auriculata* bark («turwar»), myrobolans, (4) *Zizyphus xylopysus* fruits, *Terminalia tomentosa* bark, *Eugenia jambolana* bark, *Phyllanthus emblica* (5) leaves, *Xylia dolabriformis* wood and bark, fruits of *Terminalia bellerica*, pomegranate rind and flowers, mangrove bark (imported from Zanzibar).

The first three only of these materials are in common use throughout the Presidency, the others being used only in localities where the better materials are not readily available. *Cassia auriculata* bark is largely used for skins intended for export, since it furnishes a pale-coloured leather. The tendency of leather tanned with this material to darken in colour and deteriorate on keeping is partially counteracted by a final bath in myrobolans liquors before finishing off.

The methods in use by Bombay tanners for unhairing tanning, and finishing do not differ in the main from those in use elsewhere, except as regards the use of saline acid baths for unhairing skins and in some cases hides also.

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(1) See Abstr. 1792, *Bulletin* June, 1911..

(2) «Sambur» or «Sambar» deer, *Cervus* (*Rusa*) *unicolor*. K. LYDDEKER *Encyclopedia Britannica*, 11th Edit. Vol. VII, p. 932. Cambridge, 1910 (*Ed.*)

(3) «Nilgai» or «Blue bull» (*Boselaphus tragocamelus;* the largest antelope of India, of the size of a mule. *Ibidem* Vol: XIX, p. 701. Cambridge, 1911. (*Ed.*).

(4) «Myrobolans» fruit of the *Terminalia* species. Sir G. WATT. *Theco mmercial Products of India*, p. 1972. London, 1908. (*Ed.*).

(5) The leaves are considered by the Bengal *chamars* as one of the best tanning substances; Hummel says they contain 18 % of tannic acid. *Ibidem* p. 886. (*Ed.*).

In this process the skins are put into a solution of brine along with materials which will produce acids by fermentation, such as the latex of *Calotropis gigantea* and flour made from durra grain.

The report gives detailed descriptions of the local variations of the general methods in use.

A good deal of the leather made is manufactured locally into footwear, môts (used for drawing water from wells for irrigation purposes), rollers for cotton gins, water bags and buckets, saddlery and harness, account book covers and miscellaneous articles.

A special chapter is devoted to discussing the social condition of the various classes of leather workers.

Among the recommendations made are the following : An investigation of Indian tanning materials with a view to discovering materials more suitable for tanning leather for export than those now in use ; 2) experiments in the cultivation of exotic tanning materials, such as sumac, valonia and quebracho ; 3) rearrangement of octroi duties on hides and skins in Karachi ; 4) formation of co-operative credit societies to assist needy leather workers ; and 5) the teaching of the principles of leather manufacture in schools in the chief leather working districts.

The report is illustrated with a number of reproductions of photographs of typical scenes connected with native leather industries.

A. Monticone **Tanning in Australia.** (La conceria in Australia). Il commercio del cuoio e delle scarpe in Australia. — *Bollettino del Ministero di Agric., Ind. e Comm.*, Anno X, Vol. II, Serie B, Fasc. 3, Pp. 66-68. Roma, 1° Agosto, 1911. **2934**

The principal methods of tanning in Australia are studied and applied scientifically and rationally in all the large cities of the country ; but the States of Victoria and New South Wales have acquired special importance in this branch. There is a tanning school at Sydney provided with very extensive plant used for experiments of all kinds. **Australia**

A good deal of work is done with extracts and tanning substances of local production. Quebracho, sumac and still more their extracts, as well as the derivatives of the barks of different plants, are used on a vast scale, especially for tanning ordinary leathers. Chrome is employed more and more, particularly in New South Wales. On the other hand the working of fine, delicate skins and tawing are not done, while the preparation of glove skins is quite unknown.

Machines are in extensive use; they are partly made in the country, but come chiefly from America. An American firm contributed largely to spread the use of machines in Australia by allowing long credit to its customers. Australia yearly exports leather to the amount of £500 000; three fifths of which go to London (1), the bulk of the remainder going to the United States.

Agricultural Engineering and Farm Machinery.

2935 JACQUES BOYER. **Motor Driven Farm Machinery During the Week 2-9 July 1911, at Melun, France.** — *La Nature*, No. 1995, P. 192. Paris, 19 Août 1911.

France

The motor-driven farm machinery designed by Hubert Linard and Marcel Landrin constitutes a new solution of the problem of tilling the soil. These engineers used a part of the power produced for driving the machine and the rest for those parts which open the furrow. In his automotor plough, Hubert Linard causes the ploughshares themselves to work.

M. Marcel Landrin on his part, on Sunday the 9th July, put into operation at Dammarie, his motor plough which he has been

(1) The imports of leather from Australia to the United Kingdom were:

	Quantities					Value				
	1906 Cwts.	1907 Cwts.	1908 Cwts.	1909 Cwts.	1910 Cwts.	1906 £	1907 £	1908 £	1909 £	1910 £
Raw hides .	77 467	71 485	86 601	81 421	74 654	445 376	418 753	436 958	412 428	366 865
Prepared leather . . .	704	1 204	625	273	293	5 490	7 155	4 414	3 187	7 796

Cf. *Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions*, 1910, Table 14, p. 130. London. 1911. (*Ed.*).

perfecting for the last two years. He has specially strengthened the attachment of the discs, and provided the wheels with movable blades driven by an eccentric.

In the same connection we may note the **motor** hoeing machine, useful for vineyards and nurseries. With its 4 ½ H. P. motor, this implement mounted on three wheels, the two in front being driving wheels, and the third behind simply a bearing wheel, performs, at an expense of 10 to 12 francs, an amount of work which otherwise costs 60 francs per hectare (1).

The Manufacture of Agricultural Machinery in Russia. (Die Fabrikation landwirtschaftlicher Maschinen in Russland). — *Das Handelsmuseum*, No. 23, S. 359. Wien, 8 Juni 1911. **2936**

The agricultural machine industry in Russia is concentrated in Charkow, where six large works turn out machines to a value of about three and a half million roubles (£ 373 000). Of recent years this output has increased in enormous proportions. In 1910 there were manufactured : **Russia**

Ploughs and cultivators	18 900
Drills	13 600
Mowers	5 500
Threshers	2 050

At the present time drills are the chief item of manufacture.

The Russian agricultural machine industry will undergo still greater expansion when it is supplied with larger financial resources.

Agricultural Machine Manufacture in Poland. (Fabrikation landwirtschaftlicher Maschinen in Polen). — *Das Handelsmuseum*, No. 22. P. 346. Wien, 1 Juni 1911. **2937**

In spite of the great development of agriculture in Poland the manufacture of agricultural machinery is still much behindhand in that country. This is chiefly due to the enormous importation of foreign machines, and the advertising of the latter by special agents. **Russia : Poland**

(1) 1 Hectare = 24.711 acres.

The value of the agricultural machines manufactured in Poland is 4 788 000 francs (£191 520) while that of the entire Russian Empire is 71 820 000 (£2 872 800).

The Polish machines are made at Warsaw, Ljublin, Plock, Kalisch and Sjedler.

The Polish factories build only very simple machines. They hope however soon to be in a position to construct more complicated machines, like foreign factories.

2938 SCHWEITZER. **Permanent Exhibition of Agricultural Machinery at Daressalam.** (Ständige Maschinen- und Geräte-Ausstellung in Daressalam). — *Verhandlungen der Kolonial-technischen Kommission des Kolonial-Wirtschaftliehen Komitées.* No. 1, S. 47-49. Berlin, 25 April, 1911.

A permanent exhibition of agricultural machinery and implements was opened at Daressalam on Feb. 10, 1911. Its purpose is German E. Africa to stimulate agricultural development in the colony, and to adapt German agricultural industries and machines to colonial requirements.

Up to the present there are four groups on view:

1. Agricultural implements:

Ploughs of different kinds, harrows, cultivators etc.; spades, axes, shovels, rakes etc., and tools.

2. All kinds of syringes.
3. Different kinds of filters.
4. Ginning and other machines for the cotton-harvest.

2939 **Motor Hoes in France.** — *La Nature*, 39e Année. No. 1991, p. 60. Paris, 22 Juillet 1911.

During the agricultural competition which has just been held at Chaulnes (Somme) at the beginning of June, experiments in motor hoeing were organised by the syndicates of Sugar Manufac- France turers of France, the Automobile Club of Picardy, and the Associations of Agriculturists of the Somme.

M. Bajac, manufacturing engineer of Liancourt, put into operation an ordinary six-blade hoe, made self-driving by the addition of a motor and steering gear. The motor is fitted with two cylinders of 98 mm. bore and 130 stroke; its power is 8 HP, and it can work either with petrol, benzol or alcohol. It drives the motor

wheels by means of a friction clutch, a speed reducer and a set of spur gears.

The machine is guided by two men, the driver and an assistant, who is seated behind to supervise the work of the hoes. The assistant holds a lever for regulating side motion, by which the entire apparatus is kept in its proper position in spite of the swerving of the machine, which is always possible. Another lever is within his reach for regulating the depth of penetration of the hoe blades, and for instantly raising them all.

The steering gear is specially arranged for a short turn, round one of the wheels as a pivot, as is required by the method of work, after the manner of drilling machines. On reaching the end of the field the machine is stopped; the assistant places in front of one of the large driving wheels an iron plate on which this wheel rests during turning; the driver from his seat locks this wheel, which then forms a pivot, while the large outside wheel continues to turn owing to the differential; and the turn is effected very rapidly under the control of the driver, who operates the steering wheels. In brief, each of the four wheels executes a different movement during the turn.

The machine can be regulated as desired for tracks of 0.38 to 0.45 metres, (15 to 18 inches) corresponding to total widths of work of m. 2.28 to m. (2.70 7 ft. 5 in. to 8 ft 9 in). It runs at a speed of 70 centimetres 28 in per second, and with it 5 ½ hectares (13 ½ acres) can be effectively dealt with during a 10 hours day. Of course the condition of the ground, and the skill of the farm hands affect the amount of work done. During these 10 hours the motor consumes about 30 litres of liquid fuel. The hoe, in working order, weighs about 1 400 kilogrammes (27 ½ cwt.).

Cutting Grain and Ploughing Land at Same Time. — *Farmers' Advocate, Winnipeg, Canada,* Vol. 46, No. 987, p. 1173. Aug. 23, 1911. **2940**

H. C. Pierce, a farmer in the province of Saskatchewan, cut a crop of wheat and ploughed the ground upon which it grew at the same time. For motive power a twenty-two horse-power kerosene engine was used. To this was attached a seven-furrow fourteen-inch gang plough and an eight-foot harvester and binder. To begin, the corners of the field were cut off round with horses so as to allow the out-fit to go round readily. The ploughs were hitched behind the engine and the binder behind the ploughs. At the first round **Canada Saskatchewan**

of the field the ploughs were idle but the second time round they ploughed what the binder cut the first round.

The cutting and ploughing, not including the twine, cost $ 1.42 per acre. This included wages, fuel, oil, and men's board. The average work was about two acres per hour.

2941 **Machinery for Cleaning Broom Corn.** — *Agricultural News*, Vol. X, No. 234, p. 121. Barbados, April 1, 1911.

Messrs. D. Sim & Sons, Morpeth, New South Wales. construct simple machiues for removing the seed from broom corn : these are of two kinds, one for use with horse power and one worked by hand. The former is arranged to be driven directly from the shaft of an ordinary one horse or pony gear, or by steam power; the drum is 21 inches long and 14 inches in diameter, and the machine may be driven from either side. The latter has a shorter drum, and should be particularly useful where broom corn is grown on a small scale and cheap hand labour is available for cleaning the product.

Australia: N. S. Wales

2942 **Clover Threshing Machine on Loan in the Province of Quebec, Canada.** — *Le Journal d'Agriculture et d'Horticulture.* Vol. 14, N. 12, P. 237. Montreal, 15 Juin, 1911.

The Provincial Department of Agriculture in Quebec, Canada, being desirous of encouraging the production of clover seed in the province of Quebec, has purchased two clover threshing machines. These threshers will be sent free of charge to farmers making application to the Department of Agriculture in Quebec, provided they have a sufficient quantity of clover to justify the forwarding.

Canada: Quebec

When the clover crop for seed is brought in and ready for threshing, the farmers must once more write to the Department of Agriculture in Quebec and state approximately how many tons of dry clover they require to thresh; after threshing and cleaning the seed, they must also draw up a report on the yield of seed per acre, and the total yield.

2943 **Gazoline Agricultural Traction Engines in Canada.** — See above, Abstr. 2940.

H. Boulay. **A New Forage Elevator, the "Automatique Boulay".** — *Le Cultivateur Vosgien*, 8 Vol., N. 10, Pp. 153-155. Epinal 15 Mai 1911. **2944**

This hay elevator, using Meyers' American forks and carts, is principally intended to be a contrivance for automatic unloading of forage and storing it in the barn. **France: Vosges**

The arrangement is characterised by its automatic disengaging gear on the winch on which the hauling rope for lifting the forage winds, and the likewise automatic disengagement of the gripper forks which serve to hold the forage on the car for transport to the place where it is to be stored.

J. C. Hougenson. **Dry-Farm Weed Exterminator.** — *The Tropical Agriculturist*, Vol. XXXVI, No. 4, pp. 342-343. Colombo, April 15, 1911. **2945**

The implement, as it was devised and made by a farmer of the State of Utah, consists of a rectangle 10 by 4 feet, made of 2-in. planks 8 in. wide. To the under side of the 10-feet planks are bolted 9 knives made from quarter-inch steel, 24 in. long. The steel is bent 8 in. from one end so that it will drop down behind the plank. The knives are fastened to the plank diagonally at an angle of 45 degrees by means of two bolts. **United States: Utah**

The bend is about 3 in. deep, which allows the knives to work that distance below the surface of the ground.

The long part of the steel below the bend is sharpened on the front side so as to cut weeds, this blade being about 13 in. long. The knives on the front slope to the right, while those on the rear plank slope to the left. This arrangement makes it impossible for any weeds to be missed, or any part of the ground to remain untouched. The frame work levels the land, and crushes the clods, while the knives destroy the weeds and loosen the ground to the depth of 3 in. and form a perfect mulch.

In the writer's opinion the efficiency of the machine would be increased by making the frame of channel iron and then fastening the knives on with clamps so that they can be either raised or lowered to any desired depth. Still better would be to mount it on wheels and provide a lever to raise or lower the knives. Three horses are required for this machine which is drawn over the ground as often as necessary, the usual number of times for fallow ground being three.

2946 **Machines for Extracting Citrus Essential Oils**. — *The Agricultural News*. Vol. X, No. 238, p. 184. Barbados, June 10, 1911.

Messrs. W. A. D. Allport and T. J. W. C. Davenport have invented machinery for extracting the essential oils from the rinds of limes and oranges. These machines are made in three kinds, referred to as Models I, II and IV; of these, the first is for limes or oranges, the second for limes only, and the third for oranges only. Models I and IV are worked by hand or power and possess a gravity feed; while Model II is operated by power only, under a force feed.

W. Indies: Barbados

It is claimed that the capacity in each case amounts to 20 barrels, 60 barrels and 60 barrels per hour, respectively. The yield of oil to be expected from Model I is as follows: with limes, 2 ½ to 4 oz. per barrel according to the state of the fruit, 75 per cent. of the oil being free, and the rest in the mucilage for subsequent extraction; with oranges, treated twice, 7 to 12 oz. of oil per barrel, according to the state of the fruit. The yield in the case of Model II is the same as that for Model I. Model IV, for oranges, gives the same yield as Model I for these fruits, but the material receives only one treatment.

2947 W. A. D. Allport and T. J. W. C. Davenporte. **Machine for extracting Essential Oils from Citrus Fruits** — *Journal of the Society of Chemical Industry*. Vol. XXX, N°. 18 p. 1138 - London - 30 September 1911.

This apparatus is described as follows:

A suitable feeding apparatus feeds the fruits singly to the lower end of an inclined travelling belt, the lower run of which is close to and parallel with a puncturing device; in this way the skins of the fruit are punctured as they ascend on the belt, and the oil is pressed from them by the pressure between the belt and the puncturing arrangegement. The oil falls into a trough which is situated below the belt, whilst the fruits pass down an incline, adjacent to the upper end of the belt, on which jets of water are playing to remove the oil adhering to the surface of the fruits (1).

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(1) This machine does not differ much from the Italian machine which has for long been used at Reggio Calabria (Italy) for the extraction of the essence of bergamotte. See *Inchiesta Parlamentare*. Vol. V. *Basilicata e Calabria*. Tomo II, *Calabria — Relazione del Prof.* Marenghi — Pag. 125, Roma 1909. (Ed.).

Electric Machines for Unloading Bananas — *The Times Engineering Supplement*, London, 16 August, 1911, p. 19. 2948

At New Orleans and Mobile the United Fruit Company employ motor-driven machines of the marine leg type to unload bunches of bananas from the holds of their vessels, thus saving much time and labour as well as the damage to the fruit that was formerly caused by hand unloading. A 35ft. vertical marine leg drops from an extension projecting over the water's edge into the hold of the vessel drawn up to the wharf. Sprocket wheels on the marine leg and the stationary portions of the unloader carry a pair of chains 4ft. apart, between which on cross-bars is attached a canvas strip so arranged with slack as to form pockets at 3ft. intervals. Each of the four machines at New Orleans has 92 pockets, and they are driven by individual 15 H. P. induction motors. They are able to unload 2 500 bunches of bananas an hour, the bunches weighing from 60 lb. to 120 lb. each. In the hold of the vessel the conveyors are filled from three levels, each level loading into every third pocket of the conveyor. the speed of which is too high to permit successive pockets to be filled from a single position. **United States: N. Orelans**

After reaching the dock end of the conveyor the pocket chain passes over a flat roller, which gently discharges the fruit upon a moving belt ruming back to the cars, where it is loaded for shipment by rail.

The manipulation of the booms and the hoists and the side travel of the hinge machine along the dock are controlled by friction clutches on the main conveyor motor shaft. Within three to five minutes after the vessel's hatches are made ready, the machines can be placed in position and the unloading begun. Ships can be unloaded in from 90min. to 7hrs. according to the size of their cargo.

G. Loucheux. **R. Vallat's Apparatus for Rectifying Alcoholic Liquids**. (Rapport de M. L. Lévy. *La Nature*, 39e Année, N. 2001, p. 286. Paris, 30 Septembre, 1911. 2949

Experiments were carried out in the Agricultural Industry School at Douai. **France**

The following are M. Lévy's conclusions : (1) With plates on the R. Vallat system, an alcohol from wine, lees, etc. may be freed from any of its impurities for the purpose of improving its taste or composition. (2) The residues can also be separated into : (a) a perfectly neutral alcohol ; (b) an alcohol surcharged with useful substances.

(3) The expense in fuel is less than with other non-continuous appliances. It may still further be reduced by modifying the apparatus into a continuous one. (4) This appliance would also give excellent results with petroleums, inasmuch as a continuous apparatus could be made yielding several different qualities at the same time ; with regard to this, however, further tests would have to be carried out.

2950 A. CHAPLET. **Filtering Candles. Collodionised Candles and ultra-filtration. Industrial Application.** — *La Nature*, 39e Année, N. 1998, p. 239. Paris, 9 Septembre 1911.

The production of filtering candles with extra fine pores allows of their application not only for perfect bacteriological filtration but for extremely delicate water analysis. Filtered through candles of high capillary pressure, some very clear waters, leaving no deposit **France** as a rule, are found still to be charged with mud, which would have remained completely unperceived by the usual processes. It is however possible to do still better and to obtain a filtering surface yielding water optically pure under the ultra-microscope by making use of « collodionised » candles.

Collodion bags have long been used in laboratories for dialysis, but they were hardly practical; if allowed to dry, the wall loses its properties, if heated in a liquid at 100° C., the dialytic power becomes greatly reduced. On the other hand, by externally coating a Chamberland candle, not with ordinary collodion, which would dry rapidly and then separate in brittle scales, but with glycerinised collodion, a very robust substance is obtained which does not dry and is able to stand a pressure of 4, 5 and 6 kilogrammes, while the bags burst easily. This coating perfectly preserves the substance of the candle from any contamination; the bacteria do not get so far ; it is not attacked by the water, which never contains normally the anaerobic varieties which alone can affect collodion. Finally it allows the filtering of acetone and ether if necessary, after washing in a solution of sulphide of sodium which transforms the pyroxyle into simple cellulose.

It may be noted in this connection that the superposition of two ultra-filtering walls: porous paste and collodionised membrane, may seem needless. In point of fact, the porcelain candle, which then only serves as a support, might be replaced by a less expensive and more robust fitting. This suggested itself to Messrs Fouard and de Tonnay-Charente, who make their filtering candles of a

metal lattice-work cylinder simply lined with reenforced collodion, which easily withstands filtering under a pressure of three atmospheres.

The use of collodionised ultra-filters is already being considered, not only for purifying drinking water but for the treatment of industrial liquors. At the last congress of the chemists of sugar manufactories, M. Fouard remarked that the present method of purifying beetroot juice by treating with lime and carbon, chiefly resulted in freeing the liquids from the pectic and albuminoid substances they contain. Mere passage over a collodion wall completely stops all these impurities. Under these circumstances chemical purification might be replaced by ultra-filtration, which would produce a strange and very desirable change in the modern processes of sugar making.

Therefore M. Fouard is studying the designing of filtering plates one metre wide and stacked in hundreds (like those of the industrial filters now in use) which would allow of filtering 36 cubic metres per day of sugary beetroot juice. Evidently no assumption can yet be made as to the practical value of this method, but one may venture to hope that ultra-filtration will render considerable service to the industry.

A Rubber Smoking Factory at Singapore (Straits Settlements). — *La Quinzaine Coloniale*, XV^e^ Année, No. 15, pp. 539-540. Paris, 10 Août 1911. **2951**

The following is the description given by Mr. N. Ridley, in the *Agricultural Bullettin of the Straits and Federated Malay States* (Vol. X, No. 3 pp. 63-66), of the factory built in the botanical Garden of Singapore, Straits Settlements, which has given every satisfaction both from the technical and economical point of view. **Straits Settlements**

The building is about 17 metres long and 6 metres wide. It is built of ordinary planks with superelevated roof. The plank walls are 2.45 metres high, and the height from the roof to the ridge is m. 4.55. The floor is of ferro-concrete covered with cement. Two or three windows may be opened in case of need, and there is only one entrance door. The building is built on a slope about 1/12 and drains convey the rain water away. Inside, wooden posts are planted in the ground, and between them are tightly stretched thin cables on which the rubber is suspended. Near the door circular holes are excavated in the cement with a diameter of m. 0.305 and a depth of about m. 0.90. These cavities form the fire places.

The fuel is heaped up in them and covered with sheet metal cones provided with an aperture at the top. These cones are about m. 0.56 high and have a small oblong aperture at their base to admit the air.

The fuel used is the old dry wood of soft trees. Although *Albizzia moluccana* appears the best, any other light wood may be employed. Usually only three of these fires burn during the whole day ; but there are others at the end of the building which may be lit if desired to increase the production of smoke. There is no need for any ventilation, the door and windows being usually left open. It is advantageous to turn over the rubber from time to time so that it may be uniformly smoked.

2952 **Science and Progress. New Things of Interest to Farmers. Cooperative Silo Building.** — *The Country Gentleman*, Vol. LXXVI, N. 3057, p. 9. Philadelphia, 31 August, 1911.

United States: Wisconsin

The building of reenforced concrete silos with portable forms offers a splendid opportunity for cooperation between farmers of certain localities. The Wisconsin College of Agriculture has recognized this, and has prepared a number of forms, which are rented to farmers in various communities for a small amount. The college sends out an expert to show farmers how to build the first silo in the neighborhood, then by exchanging labour they proceed to erect other silos by their own efforts. It is suggested that a number of farmers might easily adopt this idea by having a set of forms made for use throughout the community.

2953 T. Commerford Martin and Putnam A. Bates. **The Conversion of Abandoned Mills into Electric Power Plants.** — *Scientific American*, Vol. CV, No. 9, pp. 184 and 196, New York, August 26, 1911.

United States

The solution of the rural labor problem lies in making the farm an industrial establishment, where head work as well as hand work will be in demand, where the employés will be contented because of improved conditions that are at least as healthy and agreable as can be found in the cities.

A water power once in active use for mill purposes is often abandoned on the transference of the business to a city. With this power at hand a co-operative electric plant might be set on foot sufficient in many cases for all the needs of a dozen farms.

With such a system the farmer could erect much of the line work himself, and the actual expenditure would be limited to the purchase of wire, insulators, guys etc.

An instance, as worked out in this article, would cost about $ 30,000, $ 2,500 being paid by each of twelve subscribers and the power developed being 20 electrical horse-power hours per day for each of the twelve farmers.

The yearly return would pay the cost of operation and insure a profit of 20 per cent.

This outline of an opportunity for farm betterment is only typical of several that the writers themselves have observed, and doubtless, there are hundreds of small water-falls available for this purpose.

If the farmer's interest be once aroused, he is sure to recognise the merits of such a scheme, and master the situation.

The manufacturer finds capital and skilled assistants to convert his new ideas into practical commercial form, and the farmer, to be successful, must follow the same course.

2954

Sea Route between Siberia and Western Europe *via* the Arctic Ocean. — *The Board of Trade Journal*, Vol. LXXIV, No. 769, p. 381. London, August 24, 1911.

Russian Empire: Siberia

The recent decision of the Russian Government to proceed with the construction of the Siberian railway and sea routes to Archangel is likely to be of enormous commercial importance, especially to that port. Owing to the absence of cheap transport, Siberian timber and other products are at present but little exploited. It is sufficient to add that the cost of transport of a poud (36 lbs.) of wheat from Novo Nikolaevsk *viâ* the River Ob and St. Petersburg is 1*s*, 5*d*., whilst *viâ* Kotlass and Archangel it will be reduced to 8 ½ *d*., and *viâ* the River Ob and the northern seas to 6 ½ *d*. (1).

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(1) Siberia (Tobolsk, Tomsk, Yeniseisk and Irkutsk Governments). — Cultivated area, in thousands of acres, in 1907. — Cereal crops, 10 193; Potatoes, 170; Flax and Hemp, 233; Meadows, 10 429. The crops for 1909 are seen from the following, in thousands of pouds (1 poud = 36 lbs): - Wheat, 75 213; Rye, 28 149; Oats, 54 968.7; Barley, 6 346.1; Various 3 389.1; Total cereal crops, 168 065.9; Potatoes, 27 228,9; Hay, 437 114.9 Number of live-stock, in 1909 in thousands: — Horses, 4 179; Horned Cattle, 5 184; Sheep and Goats, 5 439; Pigs, 1911. (*The Statesman's Year Book for 1911*, p. 1170-1171). [*Ed.*].

2955 E. LEPLAE. **Transport by Pack Animals.** — *Bulletin Agricole du Congo belge*, Vol. II, N. 2, pp. 286-297. Bruxelles, Juin, 1911.

For want of roads practicable for vehicles, extensive use is made in new countries of pack animals for the transport of goods. This method of transport is destined to undergo great development for the benefit of the Belgian Congo region, as the building of a regular road system involves heavy expense and can only proceed slowly.

Belgian Congo

It will be readly understood therefore why the pack animal is the method of transport most in use in mountainous regions, even in Europe and the majority of tropical countries.

Loads and daily journeys of Pack Animals.

Horses. — A pack horse weighing 500 kilogrammes can, in Europe, take a load of 100 to 200 kg. and go for seven to ten hours, at a walking pace.

In hot countries, where horses are generally small, not more than 90 to 100 kg. can be loaded for daily journeys of 25 kilometres. By reducing the loads to 50 kg., 35 kilometres may be done per day.

Mules. — In mountainous countries and temperate regions big mules may be loaded with 150 to 180 kg., the daily extent of journey being 15 to 20 kilometres with a 2 hours' rest in the middle of the day.

Formerly, the great convoys of mules in Argentina transported the most varied merchandise from Buenos-Ayres to Santiago (Chili). The mules carried 80 to 100 kg. and did up to 50 kilometres per day.

In a tropical climate it is prudent not to exceed 50 to 100 kg. per load; and to limit the journeys to 20 or 25 kilometres per day. Small horses and mules should never carry more than 50 kg.

Donkeys. — The donkey is the most frugal and hardy of the equine species. It is also the least liable to illness. In spite of the coarse food they receive, they can carry 50 to 60 kilogrammes for a distance of 20-25 klm., even 30-35 klm., but at a very slow pace.

Large donkeys, such as are found in Poitou, in the United States, in Italy, Sicily and Spain, and even in Belgium, can carry up to 100 kilogrammes.

PLANT DISEASES

NOXIOUS INSECTS AND OTHER PESTS.

INTELLIGENCE

Phytopathological and Entomological Stations.

P, L. A. **The Organization of a Station of Viticultural Information.** — *Revue Scientifique*, 49e Année, 2e Sem. No. 7, p. 211. Paris, 12 Août 1911. **2956**

The organization of a service for warning of the approach of bad weather has been attempted several times, and some successful efforts in combating storms by means of explosives, have given a certain amount of encouragement to the scheme, although, so far, no pratical results have been attained. **France: Gironde**

This does not apply to the service for information concerning the treatment of vine-diseases.

Such a station exists at Cadillac-sur-Garonne. It has been a long time established and in full working order.

It was founded in 1898 by M. Cazeaux-Cazelet and has been directed from the first by M. Capus, Professor of Agriculture. Its principal work consists in at once informing agriculturists when the right moment arrives for prophylactic cupric spraying against mildew and " blackrot ".

Mr. Capus explains the methods of work during the spring and summer, (*Progrès agricole et viticole*, Juin 1911).

The Staff consists of:

1) The Director, a Professor of Agriculture.

2) An Observer, a Professor of a superior Elementary School.

3) A Secretary for the despatch of telegrams and receipt of fees.

4) Agricultural labourers and a head vine-dresser.

The researches are carried out by means of:

1) A meteorological station.

2) A micrographical laboratory.

3) Experiment plots some kilometres apart, situated in the centres where the fungi and insects are rapidly developing.

The subscribers include:

1) All the communes of the Canton of Cadillac.

2) The communes of the Gironde and the neighbouring departments.

3) The Agric. Societies of Dordogne, of the Landes and of Lot-et-Garonne, within a radins of about 100 kilometres.

4) Vine-growers.

These subscribers pay an assessment of 10 fr. a year.

They receive annually a printed notice upon the methods of treatment and the conventional abbreviations to be used in the telegrams.

All information is sent by telegram, except in the Canton of Cadillac, where a cyclist affixes short notices on variously coloured papers.

No communications are made through the press.

The authorities of subscribing communes convey the information to the inhabitants by firing guns, or beating drums, etc.

The results obtained are very encouraging, and would be shill more satisfactory, if similar stations at a distance of some kilometres also contributed their quota of information.

Similar stations have been tried at Montpellier, Condom, Châlons-sur-Marne, Auxerre etc. (1).

The Station of Cadillac is a new enterprise which is as notable for its staff, as for its methods of investigation. M. Capus has defined the kind of weather which is conducive to the development of mildew.

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(1) See also Abstract No. 2269, *Bult.* July 1911. (*Ed.*).

Non Parasitie Diseases of Plants and their Control.

A. JANSON. **Withering of the Tops of Fruit Trees.** (Spitzendürre von Obstbäume). — *Deutsche landwirtschaftliche Presse*, XXXVIII Jahrg. No. 60, pp. 702-703. Abb. 716-721. Berlin 29 Juli 1911. 2957

There are different causes for the withering of the tops of fruit trees.

1) Essential conditions of an orchard yielding a good crop are that the soil should be deep and the sub-soil permeable. Pear-trees require a depth of soil of from 44 to 52 inches. Apple and cherry trees need a soil depth of 32 to 36 in. Plums, damsons mirabelle plums, Reine Claudes, apricots, wild cherry trees and quinces at least 30 in., while peach-trees require 24 28 in. Germany

The minimum depth could be reduced to 20-24 in. by choosing as a stock a related species which has a less developed root-system, viz. in the case of the apple-tree, *Pyrus pumila* and *P. paradisiaca*; in that of the pear-tree, *Cydonia vulgaris maliformis*; of the cherry-tree *Prunus Mahaleb*; and in those of the apricot and peach, *Prunus spinosa* etc.

Dwarf fruit-trees require a minimum soil depth of 24 in., strawberry plants do well with 16 in.

Unless attention is paid to these different requirements in planting an orchard, the trees develop satisfactorily up to a certain point, then their tops, and apical buds, or the extremities of the young branches wither.

Sometimes, the impermeability of the subsoil is to blame, or the presence of stagnant water in the subsoil.

Other causes are: stagnant water on the surface of compact soils when the weather is very wet, insufficient working of the soil, in a word, anything which prevents proper aeration of the roots.

When the withering is due to any of the above causes, manures are useless; this fact makes a diagnosis of the disease easy.

2) Sometimes the wilting is due to an insufficient amount of assimilable phosphates in the soil, in which case the disease appears in the largest branches, or even the trunk, and causes the fall of the young fruits at the time of the formation of the seed, that is, four weeks after the falling of the blossoms.

3) Withering of the tops caused by frost, only occurs in the youngest extremities of the branches and is only a passing evil.

A few varieties of apple-trees in Germany lose entire branches from the action of frost, these are: *Orleans Reinette, Canada Reinette* and the *Rambour Reinette* of Paris.

4) Want of potassium in the soil is shown by the foliage turning brown and the formation of " witches-brooms ".

The dead branches fall a prey to the attacks of *Nectria ditissima, Nectria cinnabarina, Monilia fructigena, Fusicladium* etc.

Though the withering is often attributed to the action of these fungi, their part is but a secondary one, and they have only completed the damage already wrought by other agents.

Although good cultural conditions and proper nutrition are the best remedies against disease, it is necessary that all infected portions should be carefully removed; for insecticides and washes are too costly for ordinary use.

One hectare planted with apple-trees would have to yield at least 800 kg. of sound fruit to repay the annual cost of spraying.

2958 CARLO CAMPBELL. **Abortive Flowers in the Olive** (L'aborto fiorale dell'olivo). — *L'Italia Agricola*, Anno XLVIII, No. 16, pp. 376-380. 1 tav., 1 fig. Piacenza, 30 Agosto 1911.

In studying the almost total sterility of certain olive-trees, the writer observed abortion of the female organ; he then made a series of observations in order to find out the causes of this serious defect, which hitherto had not been noticed.

Italy: Campania

a) In some olive trees the female organ is always almost completely abortive.

b) In other olive-trees, this defect, though always present, is not entire.

c) Except in the case of small variations in the condition of the flower, the external variations which occur from year to year are not modified.

In order to prove definitely the persistence of the abortion, the following experiments were undertaken.

a) Manuring experiments upon trees with normal and those with abortive flovers, situated in the most varied localities and under different conditions.

b) The grafting of varieties with normal blossoms upon varieties bearing abortive flowers.

c) The ring-barking of trees which bear abortive flowers, with or without manuring.

It was proved that the so-called " male " tree is only one of which the female organs of the flowers are almost entirely abortive.

The following data have been obtained from experiments now in progress.

a) If trees with abortive flowers are grafted, fruits are usually obtained.

b) Though manuring may increase the general vigour of the plants, it has no effect upon the flower.

This shows that the tree is susceptible to changes in the amount of nutriment, but that abortion is fixed.

c) Ring-barking gives negative results.

Even cupric spraying has no effect upon plants where normal abortion is noticed; there is, therefore, no doubt as to the fixity of the occurrence.

A very small number of normal flowers occur in the case of those trees of which the majority of the flowers have incomplete female organs, and manuring and barking have the same effect upon the former as upon those trees which bear only normal blossoms.

The occurrence of abortion in the case of the olive-tree is far more widely extended than is thought.

The causes of the phenomenon are difficult to determine, but the fact is certain, for it has been observed in districts differing much in climate, soil, and biological conditions. It occurs in Africa, and perhaps wherever the olive is cultivated. The abnormal flowers are distinguished, as a rule, by greater development of calyx, corolla and stamens, as well as by a larger supply of pollen.

Where abortion occurs in almost all the blossoms the peduncle is generally shortened.

Further, the corolla. the calyx and the peduncle of abnormal flowers are lighter in colour than those of normal ones.

The abortion of the female organ is shown by the complete absence of the stigma, and often also of the style, which is replaced by a brownish excrescence; sometimes this is prolonged and the darker coloured abortive style is visible. Longitudinal sections of the flower reveal the incomplete ovary and ovules.

It has not yet been proved whether the flowers of the olive are autogamous or not; in any case autogamy is not the rule, for cross-pollination is, in some cases, necessary to the fertility of the flower.

This is a complicated biological problem which still awaits experimental research.

Prof. I. Giglioli speaks of the possible effect of hives in the proximity of olive-plantations. Bees appear to be beneficial to the setting of the fruit. Doubtless bees visit the olive-flowers, for honey made at the time of flowering of that tree has a characteristic bitter taste.

All things considered, therefore, an extensive system of grafting is to be recommended. The varieties used should be carefully studied and should come, if possible, from the same district, or, in any case, from well-known districts, so that any variety unsuited to the local climate may be excluded.

What is most important, however, is a system of careful selection, in order to eliminate by substitution, and when possible, by grafting, all plants with abnormal floral development, which not only perpetuate but probably accentuate this very undesirable tendency.

2959 S. K. Basu. **Report on the Banana Disease of Chinsurab, Bengal** (1) — *Department of Agriculture Bengal Quarterly Journal.* Vol. IV, No. 4, pp. 196-198. Calcutta, April 1911.

The disease, which is locally known as "Dhasha-Dhara", has been in existence for many years, but is supposed to be increasing to an alarming extent. It is more common in old and in neglected gardens. The variety of banana known as "Kanthali" suffers much, but that known as "Martaman" suffers most, so much that this variety—which is the most profitable in that part of the country—has become practically extinct. The varieties known as "Champa" and "Kancha" (the latter being used green as a vegetable) are free from all attacks of the disease.

The chief symptoms are: (1) The turning yellow of some of the older though otherwise healthy leaves, (2) the formation of one, or more, much reduced leaves at the crown, (3) the gra dual withering of the younger leaves, (4) and finally the breaking down of the plant. The malady progresses so rapidly that, in 10 or 15 days from its first appearance, the plant is found dead. The disease passes from the mother plant to the offshoot directly through the place of attachment. It is also probable that new infection takes place through the roots by means of the underground mycelium. Hyaline or slightly coloured septate hyphae were found in

(1 See Abstr. 328 *Bull.* Jan. 1911. (*Ed.*).

and about the fibrovascular bundles of the rootstock and the leaf-sheath. Spores of *Cephalosporium* and of *Fusarium* and a large number of bacteria have been found so far within the vessels. Further work is being done on the identification of the parasite causing the disease.

Experiments on Manuring Spruce on Moorland. – See above, Abstr. 2709. 2960

Parasitic Diseases of Plants. — Generalities. — Parasitism. — Bacteria and Fungi as Parasites and Saprophytes. — Control.

Organisation of the Study of Plant Diseases. — See above, Abs. 2501. 2961 Great Britain

P. Voglino. **Plant Diseases in the Environs of Turin, Italy. June 1911. Turin Observatory of Plant Pathology. Bulletin for June 1911.** (Osservatorio consorziale di Fitopatologia di Torino. Bolletino del mese di Giugno 1911) (1). Estr. dal Giornale *L'Economia rurale,* Organo ufficiale del Comizio Agrario del Circondario di Torino. 4 pp. Torino Luglio, 1911. 2962

Among the different diseases recorded in 1911 by the Observatory of Plant Pathology in Turin appear the following :

Myzus Cerasi, Fab. and *Hyponomeuta Padi,* Zell. on Cherry ; *Diaspis pentagona* T. T. on Ash and on Clover ; *Mytilaspis pomorum* Bouch. on Indian Chestnut ; *Leptosphaeria* sp. and *Rhynchites Icosandriae* Scop. on Pear ; *Melampsora populina* (Jacq.) Lév. and *Botryodiplodia Berengeriana* De Not. (form *Dothiorella gregaria* Sacc.), on Canadian Poplar : *Pulvinaria Ribesiae* Sign. on Currant Bush ; *Orobanche ramosa* L. on Hemp ; *Gibberrella Saubinetii* (Mont.) Sacc., (form *Fusarium roseum*) on Rye, Wheat, etc. Italy

(1) Cf. this *Bulletin* for January 1911, Abs. 278; *Bull.* April 1811, Abs. 1282 and *Bull.* May 1911, Abs. 1525.

2963 A. Olmo. **Plant Diseases in the Environs of Turin. Italy. July 1911. Turin Observatory of Plant Pathology. Bulletin for July 1911.** (Osservatorio consorziale di Fitopatologia di Torino. Bollettino del mese di Luglio 1911). Estr. dal Giornale *L'Economia rurale,* Organo ufficiale del Comizio Agrario del Circondario di Torino. 4 pp. Torino, Agosto 1911.

Italy Among the diseases of woody plants observed in July 1911 in the Plant Pathology Observatory of Turin, the following must be mentioned:

Chrysomyza Rhododendri (De By.) D.C. on Fir; *Polyporus sulphureus* (Bill.) Fries, on Larch; *Hyalopterus Pruni* Fabr., on Peach; *Sesia asiliformis* Ratz., on Canadian Poplar, etc.

Among the herbaceous plants appear the Pink, attacked by *Heterosporium echinulatum* (Berk.) Cooke; the Jerusalem Artichoke, attacked by *Phytomyza affinis* Fallé; Clover, attacked by *Cuscuta Trifolii* Bab., and by *Uromyces Trifolii* (Hed.) Lév., etc., etc.

2964 A. Olmo. **Plant Diseases in the Environs of Turin, Italy. August 1911. Turin Observatory of Plant Pathology. Bulletin for August 1911.** (Osservatorio consorziale di Fitopatologia di Torino, Bollettino del mese di Agosto 1911). Estratto del Giornale l'*Economia rurale,* Organo ufficiale del Comizio Agrario del Circondario di Torino 4 pp. Torino, Settembre, 1911.

Italy Among the diseases observed in August 1911 on woody plants the following may be mentioned:

Lophodermium macrosporum R. Hartig and L. *laricunum* Dub., on Fir and Larch; *L. Pinastri* (Schrad.) Chev., on Pine; *Microstroma album* (Desm.) Sacc., *Rosellinia quercina* R. Hartig and Oidium sp. on Oak; *Sphaerella maculiformis* (Pers.) Auers. and *Carpocapsa splendana* Hb., on Chestnut, etc. Among the diseases of herbaceous plants there may be mentioned: *Dendrophoma Marconii* Cav. and *Peronospora cannabina* Oth. on Hemp; *Septoria Endiviae* Thüm., on Endive; *Diaspis pentagona* Targ., on Pelar- gonium; *Oidium Verbenae* Thüm. and Boll., on Verbena, etc.

D. BRUNI. **Diseases of Plants in the District of Pesaro, Italy. Report on the Work of the Travelling Lectureship of Agriculture for the District of Pesaro, from March 1907 to December 1910.** *Relazione sulla attività della Cattedra ambulante di Agricoltura per il mandamento di Pesaro, dal Marzo* 1907 *al Dicembre* 1910. Pp. 37 (*Malattie delle piante*, pp. 26-28). Pesaro, 1911. 2965

Italy

Mr. Bruni reports on the work of the Travelling Lectureship of Agriculture in the District of Pesaro, from March 1907 to December 1910. He deals briefly *inter alia* with the diseases which made their appearance during this period in the environs of Pesaro, in the Marches, Italy.

Without referring to the now well known diseases of the vine, which have been little in evidence during recent years, the lecturer dealt with repressive measures against *Diaspis pentagona* in the mulberry tree (the spread of which was successfully circumscribed), against the scale insects of the citrus trees and *Evonymus*, the *Hyponomeuta* of the Apple Tree, the *Cossus ligniperda* of the Pear Tree and the Apple Tree, the *Tingis Pyri*, and the *Cassida nebulosa* of the Sugar Beet, etc., etc.

F. C. VON FABER. **On the Constant Presence of Bacteria in the Leaves of Rubiaceae.** (Ueber das ständige Vorkommen von Bakterien in den Blättern verschiedener Rubiaceen. Vorläufige Mitteilung). *Bulletin du Département de l'Agriculture aux Indes néerlandaises*, No. XLVI, 3 pp. Buitenzorg, 1911. 2966

Dutch East Indies

After a reference to the work of Zimmermann, published in 1902, on the constant presence of bacteria in the leaves of four different Rubiaceae, and the recent work of Valetan, which recorded similar bacteria knots in the leaves of a *Psychotria*, the author speaks of the remarkable results of his researches, a subject with which he proposes to deal more fully in another publication. The above article therefore must only be regarded as a provisional communication.

The results of his researches are as follows :

1. Plants containing bacteria are already recognisable by the fact that their leaves exhibit thickenings in the shape of knots which are full of bacteria.

The Rubiaceae containing bacteria are *Pavetta indica*, *P. lanceolata*, *P. angustifolia*, *P. Zimmermanniana* and *Psychotria bacteriophila*. These are cultivated in the Botanical Garden at Buitenzorg.

2. The bacteria are already present in the closed buds; they are found in the mass of resinous mucilage secreted by the colleters, and make their way along with this mass, everywhere among the young leaves.

3. Stomata form in the young leaves inside the bud much earlier than normally; these stomata in the *Pavetta* species form on the upper surface of the leaves, and in the *Psychotria* species on the lower surface.

The mass of mucilage containing the bacteria makes its way into these stomata, and accumulates in the respiratory cavities, or at once penetrates deeper into the mesophyll. At the same time the bacteria decompose the membranes of the neighbouring cells, and open out a path into the inside of the leaf. Soon afterwards curious cytological changes take place in the cells, which suggest that important physiological processes are involved.

5. The destructive action of the bacteria soon stops; they then irritate the mesophyll cells so that the latter begin to divide rapidly; the result is the formation of a specific tissue due to bacterial action. This tissue is composed of perfectly healthy cells assimilating rapidly with each other, and surrounded on all sides by bundles of veins.

6. In the bacterial tissue of the leaf large quantities of starch grains accumulate, and probably serve as the food of the bacteria. Corrosion phenomena are frequent in these starch grains, which after their hydrolysis are probably utilised as food by the bacteria.

7. The examination of other parts of the plant proved the presence of bacteria at the vegetative point.

8. The presence of bacteria at the vegetative point explains the fact of their being found in the flowers as well. They had been enclosed during the formation of the flowers.

9. The bacteria were found in the flowers and fruits of all the above named Rubiaceae; in the seed they occur chiefly between the envelope and the endosperm. In all these parts of the plant the bacteria do not appear in such large quantities as in the "Leaf knots." They at first appear, but in a feeble degree, at the vegetative point. A large increase is, however, at once manifest when the resinous gum is secreted by the colleters.

10. The bacteria of *Pavetta indica* and of *Psycotria bacteriophila* have already been successfully bred in pure cultures. The result showed was that there is only one single species of bacterium in each plant. The bacteria of the Rubiaceae exhibit great similarity; they are probably only adapted forms of a single species.

11. By various investigations, Mr. von Faber reached the conclusion that bacteria play an important part in plant life, because they are capable of fixing atmospheric nitrogen. Further investigations confirm this supposition.

12. Probably the fixation of nitrogen takes place only in the " bacterial knots ," because only here considerable masses of bacteria are found. Nitrogen appears in the bacterial tissue principally in the form of albumen.

In an appendix to his article, the author says that Miehe in his investigations into the leaf knots of *Ardisia* arrived at the same results for the *Myrsinaceae* as he did for the *Rubiaceae*. Miehe's results are published in the "*Berichte der deutschen botanischen Gesellschaft.*"

Crown-Gall (1). *Board of Agriculture and Fisheries.* — *Leaflet*, No. 245, p. 3. London, June, 1911. **2967.**

The presence of galls or tumor-like outgrowths on the roots of plants of various kinds has long been known in Europe, perhaps more especially on vine roots. When they are old such galls become hard and woody, and indicate no trace of their origin, and this accounts for the generally accepted opinion, in the absence of any parasitic organism at that stage, that the primary cause of such galls is due to wounds, frost, or to some physiological disturbance. **Great Britain**

Quite recently the occurrence of galls in every stage of development, on the roots of the Paris daisy (*Chrysanthemum frutescens* L.) admitted of a thorough investigation of the subject, and showed clearly that the galls were identical with the well-known and very destructive disease called « Crown-gall » in the United States. Specimens of similar galls on plum, rose, raspberry and loganberry have recently been sent to Kew. In the United States the following plants are attacked in addition to those mentioned above : — Peach, apricot, almond, prune, apple, cherry, poplar, chestunt, and blackberry. There is at present no direct knowledge as to the relative frequency of crown-gall in Great Britain, but judging from the literature relating to plant diseases, galls answering to crown-gall are far from uncommon in every country where fruit trees are grown.

Crown-gall is very destructive to nursery stock, as the disease spreads rapidly along the rows, killing a large number of seedlings

(1) Cf. Abstr. 623 and 626, *Bulletin*, February 1911; Abstr. 1894, June 1911; Abstr. 2286, July 1911. (*Ed.*).

outright. When older trees become infected, the galls may continue to be produced for many years.

Two distinct organisms have been found to occur in the tissues of the galls, but a bacterium *Bacillus tumefaciens*, has been proved, in America, to be the primary cause of the disease.

As crown gall is caused by a parasite and is highly contagious, measures should be taken to prevent the spread of the disease. Badly diseased trees should be removed, and the galls along with the wood in their vicinity should be burned at once. When trees are only slightly diseased, the galls should be cut away, and the wounds covered with a paste composed of two parts of sulphate of copper, one part of sulphate of iron, and three parts of quicklime. Quicklime should be worked into the soil in orchards known to be infected.

2968 Germany **Fungi as a Cause of the Withering of Tree Tops.** — See above, Abstr. 2957.

2969 America: France. **Fungus-growing Ants.** — See below, Abstr. 3016 and 3019.

2970 A. A. JACZEWSKI. **On the Importance of Selection in Combating Cryptogamic Diseases in Cultivated Plants.**(1) (O Snacenii Selekzii v Dielie Borbi s' Gribnimi Boliesniami Kulturnekh Rastenii). *Trudi Biurö po Mikologhii i Fitopatologhii Ucenago Komiteta*, pp. 1-38. S. Peterburg, 1911.

Russia In this publication the author deals with the importance of selection as a means of obtaining types of plants capable of withstanding the attacks of cryptogamic diseases without great harm. He cites many examples, from the literature on the subject and from practice, in support of the considerations which he sets forth, which may be summed up as follows:

1. The introduction of resistant plants from other localities and their acclimatization.

2. Selection of local types found the most resistant, followed by a search for methods of cultivation by which this resistance may be increased.

(1) Cf. Abs 1121. *Bull.* April 1911. (*Ed.*).

In making this selection, it is better to take a single type as the point of departure in order to avoid the generally unfavourable consequences of crossings.

3. In the choice of types, the principle should generally be adopted of assisting and profiting by natural selection.

While local ecological factors slowly determine the disappearance of weaker individuals, they favour the growth and spread of those which are stronger, and which adapt themselves better to a given locality.

4. A great deal may also be done by means of hybridization. Very often it is found that strong varieties are not best adapted for cultivation, because they yield an inferior and scanty product.

It has, however, already been proved that these drawbacks may be disposed of by crossing the strong types with prolific types.

5. Grafting productive types on resistant individuals.

Example; grafting on American Phylloxera-resisting Vines.

The author observes that this work of selection involves many difficulties, and that it certainly cannot be carried out by simple farmers. It therefore opens a new field of fruitful activity for the experimental stations of Russia.

Not unintersting likewise is the table which the author has drawn up of all the more resistant varieties of the principal plants cultivated in Western Europe and North America.

G. Paoli. **New Parasitic Laboulbeniaceae of the Acarids.** (Nuovi Laboulbeniomiceti parassiti di Acari). *Redia*, Vol. VII, fasc. 2°. pp. 283-295, tav. XII. Firenze, 1911. **2971**

A description of six new species of Laboulbeniaceae (1) found as parasites on Acarids of the Gamasides family. The species are : *Rickia javanica, R. Coleopterophagi, R. minuta, Dimeromyces mucronatus, D. falcatus* and *D. muticus*. **Italy**

Furthermore, the author connects with the genus *Rickia*, known under the name of *R. Berlesiana* (Bacc) Paoli, another Laboulbeniacea formerly described by M. Baccarini as *Rhacomyces Berlesiana*.

With regard to geographical distribution, the new species described are all special to tropical or sub-tropical regions, (Java, India, Southern America, Australia, Africa), with the exception of the *Dimeromyces falcatus* which has been found in Tuscany.

(1) See this *Bull.*, Dec. 1910, p. 354.

2972 H. A. Tempany, **Parasitic Fungi of Scale insects in Dominica** (1). (Agricultural Matters in Dominica). — *The Agricultural News*, Vol. X, No. 240, p. 213. Barbados, July 8, 1911.

Leeward Islands: Dominica

The following particulars form part of the report of a visit to the Island of Dominica, made by Mr. A. Tempany, Inspector of Agriculture in the Leeward Islands, in connexion with the interests of agriculture in that colony.

In an estate on the island, oranges had for a long time suffered greatly from a scale insect which devoured them; these inroads have now abated apparently, in a perfectly natural way.

Among the parasitic fungi on the scale insects, *Sphaerostilbe coccophila* and *Ophionectria coccicola* were present in large numbers, and ths importance of these in destroying scale insects is well known.

Iu another estate on the island, these fungi are also found very useful from this point of view, and it was observed that their beneficial work is even accomplished in places where the plants are much exposed to strong winds, provided there is a heary rain-fall.

After referring to the necessity of providing improved means of transporting produce in Dominica, and to certain schemes in connection with this, the report proceeds to draw attention to the extent to which Para rubber is being planted in the island.

It is considered by Mr Tempany that the suitability of *Hevea* for planting in Dominica, as compared with *Castilloa* and *Funtumia*, appears to have been clearly demonstrated. *Funtumia* is less successful; while the small progress observed in the *Castilloa* plantations proves that very careful cultivation, and a considerable rainfall are necessary conditions for success in growing this plant.

The endeavour is now being made to develop the vanilla industry in the Island. A large area has already been planted; the physic nut (*Jatropha Curcas*) is used as a support for the plants; the planting material is supplied by the Botanic Station.

2973 ***Empusa Sphaerosperma*, Natural Enemy of the *Phytonomus Nigrirostris*.** See below, Abst. 3015.

(1) Cf. also p. 171 *Bull.* Nov. 1910; p. 374 *Bull.* Déc. 1910; Abst. 341 *Bull.* Jan. 1911; Abst. 650-651 *Bull.* Feb. 1911; Abst, 1562, *Bull.* May 1911; Abst. 1952 *Bull.* June 1911; and Abst, 2281 *Bull.* July 1911. (*Ed.*).

J. RUBY and L. RAYBAUD. ***Apiosporium Oleae*, a Parasite of the Olive Tree Scale Insect.** *Comptes rendus hebd. de la Société de Biologie*, T. LXXI, No. 26, pp. 214-216. Paris, 28 Juillet, 1911. 2974

On the leaves and branches of the olive tree invaded by *Lecanium Oleae* (1), it is no rare thing at certain periods, to observe a very high mortality in young individuals of the species, which dry up turning orange-yellow. Various writers have attributed this death to micro-organisms, by which the body of the insect was invaded; nothing precise however has been said on the subject. France

Having latterly observed cases of very high mortality of *Lecanium*, the writers took occasion to resume the study of this question,. They found again, in the form of yeast cells, the micro-organisms seen by other authors, and the idea occurred to them that there might perhaps be some relation between these yeast cells and the fungus which causes the " black " of the olive tree, *Apiosporium Oleae*, which is known to be very abundant in the leaves along with *Lecanium Oleae*.

The enquiries made by the writers appear to them to prove that there is a specific identity between the yeast forms inside the body of *Lecanium* and *Apiosporium* of the olive leaves. It remains to be proved by direct infection, that these yeast forms are really the cause of the death of *Lecanium*, often attributed by the olive tree cultivators to cold. It appears rather improbable that this fungus should thus invade the body of the insect, in which it is sometimes very abundant, without causing it any damage ; and it must be noted further that the mortality of *Lecanium* is especially remarkable on leaves where the " black " has made great inroads.

Influence of Radio-active Minerals on Corn Mildew *(Erisyphe graminis)*. — See above, Abstr. 2456. 2975 Australia : Victoria

(1) See Abst. 1041. *Bull.* for March 1911.

Parasitic Diseases of Various Plants and Means of Prevention and Cure (1).

2976 DIDIER HEGYI (Director of the Institute of Vegetable Physiology and Pathology at Magyaróvár, Hungary). **Study of Ustilagineae: I. Wheat Smut.** — *Communicated by E. de Miklós de Miklósvár, Hungarian Delegate at the International Institute of Agriculture.*

In October 1910 Mr. Hegyi began a series of experiments with the object of showing the real extent of the damage caused by "Smut" to wheat in Hungary. It is generally estimated that if smut-infected wheat constitutes a proportion of 10 % in a wheat field, one-tenth of the harvest must be lost. The writer states that this opinion is wrong, and the object of his experiments was to show the ratios existing between the number of smutty ears and the real damage caused by the disease.

Hungary
Magyaróvár

Mr. Hegyi, on the 15th October, 1910, sowed some wheat, strongly infected with the disease, in a plot of 120 square metres, (143.52 sq. yds.) in the experimental field belonging to his Institute. At the same time he sowed in another plot, of the same area, the like quantity of the same wheat, but treated with a 1 % solution of sulphate of copper. The wheat used had suffered so much from the disease that its colour was a dirty brown in consequence of the spores adhering to the surface; thorough preliminary screening followed by winnowing had, however, removed the seeds full of spores. The germinating power of this wheat was surprising (98 %).

At harvest time the crop from the untreated plot did not appear so dense as that from the plot treated. Both plots were reaped on the 7th July 1911. The percentage of smutty wheat was first determined. For this purpose 2 000 ears were taken at random from each of the two plots, and afterwards sorted. In the untreated plot, 687 ears were diseased, and 1313 sound, that is to say, the percentage of the "smutty wheat" amounted

(1) The plants succeed each other in the same order as in the first part of this Bulletin.

to 34.35 %. In the other plot there were only 18 smutty ears and 1982 sound, i. e. 0.9 % damage. After threshing, there was found for the untreated plot, a production of 11.75 kgs. (1) of grain and for the other, 26.25 kgs ; which corresponds to 9.8 quintals and 21.87 quintals per hectare respectively, (7 cwt 90 lb and 17 cwt 17 lb per acre).

A glance at these figures suffices to show that they are not in proportion to the percentage of smutty wheat. If the proportion had really held, the yield on the untreated plot would have been only 34.35 - 0.9 = 33.45 % less than the other, and 17.47 quintals per hectare (13.92 cwt per acre), and not 9.8 quintals, should have been obtained. Therefore, besides the smutty wheat which caused a loss of 8.78 quintals per hectare,(6.93 cwt per acre) there was recorded a further almost equal diminution of 7.67 quintals (6.06 cwt).

For the purpose of studying this question the writer calls this second loss " hidden damage ", because it had never been taken into consideration hitherto, reserving for the first loss the expression " evident damage " (8.78 quintals) ; and the term " effective damage " equal to the sum of these quantities, is in the present case 16.42 quintals (12.97 cwt). Therefore the evident damage is 34.35 %, the hidden damage 28.27 % and the effective damage 62.62 %.

The writer therefore concludes that the *effective* damage is considerably greater than the *evident* damage, the only one hitherto taken into account.

With a view to ascertaining the ratio between the evident and the hidden damage, Mr. Hegyi also carried out some experiments of which the result is as follows :

He treated a certain quantity of the same seed with wood ash, a method used in some parts of Hungary against " smut." The mode of operation is as follows :

Wood ash is sifted over a pile of wheat, which is then turned and mixed so that the wood ash forms a coating round each grain. The writer sowed some wheat treated thus, in a third plot, of 120 sq. metres (143.5 sq. yds) near the two others. The harvest took place on the same date, and out of 2000 control ears, 179 (or 8.95 %) were found smutty and 1821 sound. Comparing this result with that of the untreated plot (34.35 % of smutty ears), he concludes that wood ash is an effective remedy. This method of treatment however is not so efficacious as that of Linhart (Sulphate of copper), as the figures prove. The crop from this plot was 20.5 kgs. of grain, equivalent to 17.08 quintals per hectare. (13.61 cwt per acre).

(1) 1 kg. = 2.2046 lbs.

On the plot treated with wood ash, there were 8.05 % of smutty ears more than on the plot treated with sulphate of copper. If the proportion had been maintained in the production, the latter would have been 20.12 quintals per hectare, (16.03 cwt per acre), while it was only 17.8 quintals, thus showing a hidden damage of 3.04 quintals (2.42 cwt per acre) in addition to an evident one of 1.75 quintals, and while in the case previously examined the hidden damage was less than the evident (87 % of the latter), it is in the present case 173 %. Therefore the proportion between the hidden and evident damage is variable.

Mr. Hegyi concludes from this study that the biology of this fungus is not well known at the present time, for if it were, the evident damage would be the same as the effective damage.

In his opinion, therefore, further experiments are indispensable.

2977 Brazil **Wheat Rust in Rio Grande do Sul.** — See above, Abstr. 2538.

2978 Great Britain **Potato Bacteriosis in Great Britain.** — See above, Abstr. 2958.

2979 **Rust of Broad Beans (*Uromyces Fabae*) in the West of England.** — *The Gardeners' Chronicle*, Vol. L, No. 1287, p. 151, London, August 26, 1911.

Great Britain: England: Worcestershire

Broad beans in the West of England have been badly attacked this season with the rust fungus (*Uromyces Fabae*). The disease first attacks the leaves and haulms, upon which it appears as rusty spots, and the spores rapidly spread to the rest of the plants. Infection from year to year takes place from the diseased spots on the old haulms stored in ricks, so that, if the disease is noted one year, all possible care should be taken to diminish the danger of infection from this source. This malady is seldom dangerous, unless it attacks the beans at a very early stage, and in parts of Worcestershire, where the trouble used to be serious, it has been almost completely prevented by sowing winter beans. Where this disease did damage during 1911 early sowing is strongly recommended.

EDWARD C. JOHNSON. **Timothy Rust *(Puccinia Phlei-pratensis)* in the United States.** *U. S. Depar. Agr. Bur. Plant Industry. Bulletin* No. 224, pp. 20. Washington, August 4, 1911. 2980

The rust of timothy (*Phleum pratense L.*) was reported in the United States as early as 1882 (WILLIAM TREALASE. *Parasitic Fungi of Wisconsin. Transactions of the Wisconsin Academy of Sciences*, 1882, p. 131). It was reported from Iowa in 1891. From 1891 to 1906, no mention of the parasite in the United States has been found by the writer. In 1906 the rust became epidemic at the Arlington Experimental farm, near Washington, D. C., and since then has been found to be widespread, having been reported from Maine to Ontario and northern Minnesota, and south to Iowa, Kentucky and Virginia. United States

Timothy rust is similar in general appearance and morphological characteristics to *Puccinia graminis* Pers, on wheat.

Inoculation experiments with timothy rust at Washington, D. C. show that it can be transferred easily to various grasses. Similar results have been obtained by Eriksson in Europe. (ERIKSSON and HENNING): *Die Hauptresultate einer neuen Untersuchung über die Getreideroste. Zeitschrift für Pflanzenkrankheiten*, vol. 4, 1894, p. 180. — ERIKSSON and HENNING. *Die Getreideroste*, 1894, p. 137. — ERIKSSON: *Ist der Timotheengrasrost eine selbständige Rostart oder nicht? — Öfversigt af Kongliga Svenska Vetenskaps-Akademiens Förhandlingar*, No. 5, 1902, p. 191). This demonstrates that the rust in the United States and the rust in Europe are identical. That it is not a well-fixed species is substantiated. By using bridging hosts, timothy rust can be made to transfer itsctf to various cereals which it will not attack directly. That such transfers take place in nature to some extent is probable.

The aecidial stage of this rust is not definitely known. Eriksson and Henning in numerous inoculations with the teleutospores on barberries obtained negative results, except in one instance. On this basis they consider the rust a distinct species, naming it *Puccinia phlei-pratensis*. Kern has observed several unsuccessful inoculations on the barberry in the United States (KERN, F. D., *The Rust of Timothy — Torreya*, vol. 9, January, 1909, p. 4. — KERN, F. D., *Further Notes on Timothy Rust. — Proceedings of the Indiana Academy of Science*, 1909, pp. 417-418). From the one apparently positive result of Eriksson and Henning, however, he believes that the rust is not entitled to specific rank, and should be included under *Puccinia graminis* Pers. Evans accepts the name *Puccinia Phlei-pratensis*, and shows that there are well-marked differences in the

details of the infection from the uredospore of this rust, and the *graminis* from cereals (*Annals of Botany*, Vol. XXI, No. 84, 1907, Pp. 446-448). It is evident that this rust has many distinctive characteristics and the writer favours the use of the specific name *Puccinia phlei-pratensis* Erikss. and Henn.

At the Arlington Experimental Farm the rust mycelium lives through the winter. It is very probable that it lives over winter in the uredo stage much farther north than the latitude cited. As the aecidial stage, if present, is undoubtedly rare, the teleuto stage is of doubtful importance in the wintering and dissemination of the rust.

In a study of the resistance of varieties of timothy to rust in 1908 and 1909, W. J. Morse found that the resistance varied greatly, ranging from 0 to 98 %. The resistance of different strains relative to each other varied little during the two years. Under a less severe rust attack in 1910 these strains in many instances failed to retain the same relative position as in previous years.

In greenhouse experiments, where strains which had been tested in the field were subjected to similar inoculations, and identical conditions during the period of incubation, the percentage of inoculated leaves which escaped infection did not correspond with the figures on rust resistance obtained in the field. When however, the severity of infection and not the percentage of leaves developing pustules was considered, the relative resistance of strains as obtained in the field was fairly well maintained in the greenhouse.

As there are wide differences in timothy strains with regard to rust resistance, the problem in timothy-rust prevention becomes one of breeding.

2981 G. Severini. **On a New Disease of Sainfoin, in Italy.** (Intorno ad una nuova malattia della Lupinella). *Le Stazioni Sperimentali Agrarie Italiane*, Vol. XLIV, fasc. 5-6, pp. 414-416. Modena 1911.

During the summer of 1910 and this year, from spring onwards, a new disease developed in the Sainfoin, in the environs of Perugia, **Italy: Umbria** and caused great damage to fodder production both in quality and quantity.

On the folioles little black, shiny, round and irregular pustules are first seen to appear, which swell up in the centre of a black spot, encircled by a yellowish aureola. These pustules are irregularly distributed over the two faces of the foliole.

Afterwards the pustules grow opaque, the different black spots spread little by little, merging into each other, and forming large blotches on the folioles, which before long dry and fall. In most instances the pustules are also found on the petioles, and are arranged in longitudinal rows, which end by forming a crusty black coating all round.

Within a period of 15 to 20 days after the first symptoms of the disease, particularly if the season is rainy, the plants are almost completely black and very quickly lose their folioles.

In the diseased parts, the presence of pycnidia is observed, and afterwards the perithecia of a fungus which is evidently the cause of the disease.

M. Montemartini had already observed a disease of sulla (Spanish sainfoin), giving rise to the same pathological symptoms and ascertained by him to be due to a new species of *Anthostomella* (*A. Sullae*).

The writer is of opinion that the pycnidian and ascophorous forms found on the sainfoin, belong respectively to the species *Leptothyrium* and *Anthostomella*, like those of sulla.

Nevertheless, a comparative examination of the fungus on the sulla, and that found on the sainfoin, brought out certain characteristics differentiating them. Mr. Severini therefore thinks that the sainfoin fungus should not be immediately identified with *A. Sullae*. Infection experiments alone will allow of ascertaining whether there are two perfectly distinct forms or varieties.

To arrest the spread of the disease, the author advises rapid destruction of the plants attacked. It will consequently be expedient to mow the forage very early, before the fructiferous organs of the fungus ripen ; or better still, the soil should be tilled and sainfoin replaced by some other crop.

G. K. KELKAR. **Ground-Nuts in the Bombay Deccan.** — *Department of Agriculture, Bombay. Bulletin*, No. 41, pp. 17. Bombay, 1911. **2982**

The ground-nut is one of the most important oil plants of India. It is exclusively cultivated in the environs of Madras, Bombay and Burma. The largest area under ground-nuts is in the district of South Arcot, Presidency of Madras, where it covers about 200 000 acres. **British India: Java: German East Africa**

In the Presidency of Bombay, ground-nut ranks fifth among the oil plants.

The only disease causing considerable damage to the groundnut in the Presidency of Bombay, is the cryptogamic disease called "tikka" (*Septogloeum Arachidis*).

The plants suffer from withering of the leaves and stalks, which prevents the development of the seeds, many of which are hollow.

Since 1901, experiments have been carried out with fungicides on the Poona farm, but up to now the results have been negative.

The same disease occurs in the Presidency of Madras, at Java, and in German East Africa (1).

2983 G. L. FAWCETT. **Coffee Diseases. *Pellicularia Koleroga* in Porto Rico.** *Annual Report of the Porto Rico Agricultural Experiment Station for* 1910. Washington, 1911.

In 1910 the coffee plantations of Porto Rico sustained great damage from the attack of a fungus, *Pellicularia Koleroga*.

Porto-Rico The trouble is greater in wet seasons, as they favour the growth of the mycelium, which attacks and causes the fall of the leaves; this mycellium is the form in which the fungus is developed and propagated.

In combating this parasite, good results are obtained from applications of Bordeaux mixture, by diligent pruning and by keeping the plants far enough from each other.

2984 **Finger and Toe Disease *Plasmodiophora Brassicae*.** — *Gardeners' Chronicle*, Vol. L, No. 1287, p. 150. London, August 26, 1911.

Experiments on this disease have been recently conducted by Mr Walter E. Collinge, who finds that lime, followed by a dressing of sulphur, is much better in checking the malady than lime used alone. A field known to be very badly attacked was treated Great Britain in the autumn of 1909 with a dressing of 15 cwt. of ground, unslaked lime.

In the spring the same land was given a dressing of flowers of sulphur, 5 cwt. to the acre. An excellent crop of swedes was lifted the following autumn, and the roots were practically free from disease. On only one corner of the field was the disease noticeable, and this but little. On this patch there was a considerable

(1) Cf. Abst. 1542 *Bull.* May 1911; Abstr. 1749 *Bull.* June 1911. (*Ed.*).

(1) See page 162 of this *Bulletin*, November 1910.

amount of heavy clay, which was in a very wet and sticky condition and, quite apart from the fungus disease, badly required liming. A part of this ground, about one-sixth of an acre in extent, was again treated with ground, unslaked lime at the rate of 12 cwt. to the acre in the autumn, followed in the spring with sulphur as on the previous occasion. When the swedes were lifted in the autumn of 1910, no trace of the disease was found, and the physical condition of the soil had greatly improved.

Bacteriosis of the Potato and Tomato. (1). — *Board of Agric. and Fish. Leaflet.* No. 242, p. 2. — London, June 1911. 2985

The bacteriosis of the potato and tomato has been known for some time in the United States, where it has been carefully studied by Dr Erwin F. Smith. The organism concerned is called *Bacillus solanacearum* G. F. Smith. Potatoes, tomatoes, and egg plants are attacked, sometimes on a large scale, in America. In Great Britain, the disease was first observed in 1902 on some potato fields in the North of England and in Scotland. During 1910, it attacked tomatoes to a somewhat serious extent. Great Britain

Infection usually takes place at or near the tip of the stem, the disease gradually working downwards, until the root is reached. The leaves become marked with blotches, and the stems, with long dark-brown streaks. In tomatoes the fruit becomes covered with dark-coloured blotches, which finally collapse and form irregular pits on the surface of the fruit. In potatoes the infected tubers show a brown ring situated at a small distance from the outside, and corresponding to the position of the vascular-bundle ring of the tuber. The central mass then gradually assumes a brown colour, and finally becomes soft and rotten, leaving a thin outside crust intact. The vascular bundles of the infected plants are teeming with bacteria.

The preventive and remedial measures advised are: avoid seed or tubers obtained from plants grown in an infected area; spray with Bordeaux mixture containing an insecticide (quicklime 10 lb., copper sulphate 10 lb., Paris green 8 oz., water 100 gallons), which answers the double purpose of warding off insects and preventing the appearance of *Phytophthora infestans*, *Cladosporium fulvum* and other pests; treat infected soils with gas-lime or with superphosphate of lime.

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(1) See p. 163 *Bull.* Nov. 1910; Abstr. 1544, *Bull.* May 1911. (*Ed.*)

2986 **The Septoria Disease of Tomatoes.** — *Board of Agriculture and Fisheries, Leaflet,* No. 225, 3 pages, London. May 1909. Revised, August, 1911.

In 1907 and 1908 tomatoes were found to be attacked by a disease which had not previously been known to exist in Great Britain, but which was first reported from South America, the native country of the tomato. As far back as 1884 it was described by Spegazzini as attacking tomatoes grown in Argentina. Since then it has appeared in Australia ; and shortly after the introduction of tomatoes into Europe it was recorded in Italy, France, Germany and other continental countries. The damage involved is very serious.

Great Britain

The fungus which causes the disease (*Septoria Lycopersici* var. *europea* Briosi et Cavara) is closely related to the » leaf spot » disease on strawberrles, apples, pears, and chrysanthemums, (1) but is quite distinct from any of these, and it has been proved that spores of the fungi causing » leaf spot » on the plants named above are incapable of producing this particular disease on tomatoes. In the same way, experiments made with the object of infecting potatoes and other plants with spores from this tomato fungus have not resulted in any injury.

The tomato plants attacked show small blackish-green spots on the leaves. These are irregular in shape at first, but soon become concentric and finally confluent, and the leaves, which are rapidly killed, roll up and hang loosely from the stem. The fungus also attacks the stem, the calyx, and finally the fruit itself. When no remedial measures are taken, the whole plant may be destroyed within 7 days from the first sign of the disease.

A description and life-history of the fungus are given in this leaflet. Experiment has shown that in order to combat this disease great care must be exercised. The following precautionary measures should be adopted.

1) Plants once attacked, can only be saved by spraying immediately the first signs of disease are noticed. The plants should be spray-

(1) According to STEVENS and HALL the « Leaf Spot » of strawberries, apple and pear trees and chrysanthemums is due respectively to *Sphaerella Fragariae* (Tul.) Sacc., to *Sphaeropsis Malorum* Peck., to *Septoria piricola* Desm., to *Septoria Chrysanthemi* Allesch. See G. MASSEE *Diseases of Cultivated Plants and Trees;* pp. 194, 225, 413, London 1910. and F. L. STEVENS and J. G. HALL: *Diseases of Economic Plants,* pp. 81, 108, 181, 461. New York 1911. (*Ed.*).

ed with a 3 per cent. solution of Bordeaux mixture (*i. e.* 3lb. copper sulphate, 2 lb. quick lime, 10 gals. water), early in the morning every second day for 2 weeks.

2) Badly attacked plants should be cut back, or better still, uprooted and burned.

3) Any wires and props used in the houses, or in the open air, should be slowly drawn through fire, in order to kill the spores adhering to them.

4) The top soil should be removed and mixed with fresh lime in the proportion of one barrowful of lime to five of soil. It can be replaced after the lime has slaked.

5) When planting young tomato plants, pulverised lime should be scattered on the ground round the stems.

6) Tomato seed from infected areas should not be used.

Tomato Leaf Spot (*Septoria Lycopersici*, Spegazzini), which is identical with the septoria disease of tomatoes described above, is scheduled by the Board under the Destructive Insects and Pests Acts, 1887 and 1907, and its presence must be at once notified to the proper officer, or, to the Board, on pain of a maximum fine of £.10.

A. W. Giampietro. **Onion Rot Due to a Bacterium: *Bacillus coli*.** Preliminary Note. (Un marciume delle cipolle dovuto ad un batterio; *Bacillus coli*. Nota preliminare). *Rivista di Patologia vegetale*, anno V, num. 4, pp. 49-52. Pavia, 15 Luglio, 1911. (Comun. del Lab. di Pat. veg. del Dip. d'Agric. degli Stati Uniti, Washington. **2987**

United States

The writer had occasion to study some specimens of onions from Stepherdstown, suffering from a soft, granular, greasy rot, dark green in colour, and smelling foully. Generally, this rot, evidently of a bacterial character, went from top to bottom; sometimes the entire bulb was invaded, and it became soft, especially in the lowest part.

This disease had already been observed by F. C. Stewart, who, observing the presence of mobile bacteria in the diseased bulbs, had taken the latter to be the cause of the rot; also by Sorauer, who held that the disease was produced by different species of mobile bacteria; and lastly by Delacroix, who affirmed that the disease was due to a bacterium which he called *Bacillus cepivorus*.

For this reason the Mr. Giampietro was desirous of definitely identifying the pathogenic micro-organism. The first morphological examination confirmed the observations of Stewart and Sorauer as to

the mobility of the micro-organism. Furthermore, it was ascertained that this micro-organism is not coloured by Gram's reagent (1); that it produces gas and indol and presents other characteristic features which connect it with *Bacillus coli*. The large number of experiments carried out by him for comparing this latter bacillus with the micro-organism of onion rot, have convinced the writer that *B. cepivorus of* Delacroix is identical with *B. coli*.

2988 CARLO SPEGAZZINI ***Peronospora Schachtii*, an Onion Pest in la Plata (Argentina).** (Una nueva plaga). — *Revista horticola*, año I, pp. 13-24, Buenos-Aires, Abril de 1911.

In November 1910, the writer noted in an onion plantation, near La Plata, that for the first time a serious cryptogamic disease, due to the *Peronospora Schachtii* (2), already so frequent and injurious in Europe, had developed. **Argentina**

The disease appears suddenly and spreads rapidly. The leaves begin to rot, wrinkle, and change colour from the top, whence the disease spreads to the base; the parts attacked are afterwards covered with a kind of greyish film, produced by the conidiophores of the fungus, which afterwards form the oospores in the foliar parenchyma. It is consequently necessary to cut and burn immediately all the infected leaves.

Mr. Spegazzini believes that this *Peronospora* was imported with onions from Europe, which were used for planting instead of food.

As a preventive, he advises weekly sprayings with a 2 % Bordeaux mixture, with an addition of glucose to make it adhere better to the leaves.

2989 T. C. JOHNSON. **Spraying Cucumbers and Cantaloups.** — *Experimental Station Bulletin*, No. 5, pp. 85-100, Norfolk, Virginia, March 31, 1911.

The cryptogamic diseases of cucumbers and cantaloups, and above all the mildew of the Cucurbitaceae (*Plasmopara cubensis*), and the anthracnosis of the melon (*Colletotrichum lagenarium*) have spread to such an extent in some industrial districts of Norfolk, **United States: Virginia**

(1) Gram's solution consists of; Iodine (1 gr.), iodide of potassium (2 gr.) and water (300 gr.) Cf. E. DUCLAUX, *Traité de Microbiologie*, T. I. p. 134. Paris 1898. (*Ed.*).

(2) See also Abstr 1055, *Bull.* March 1911 (*Ed.*).

Virginia, that some farmers have been compelled to abandon the cultivation.

The annual loss is variously estimated at from 10 to 40 % of the total production. The total production of cucumbers near Norfolk (Virginia), is about 350 000 bushels, and that of cantaloups, 35 000 crates.

The " Virginia Truck Experiment Station " (Norfolk) carried out a series of experiments from 1908 to 1910 for the protection of fields against these pests.

A cucumber field was subjected to spraying with home-made Bordeaux mixture (3½ lbs. of sulphate of copper, 6 lbs. of freshly burnt quick-lime, and 50 gallons of water), and produced 59.1 % more fruit than non-treated fields, while " sulfocide," " self-boiled " sulphide of calcium and commercial sulphide of calcium (1) caused a loss of 11.4, 24.8 and 65.8 respectively.

The sprayings with home-made Bordeaux mixture (3 lbs. of sulphate of copper, 6 lbs. of quick-lime, and 50 gallons of water) increased the output by 11.2 % ; the sulfocide, self-boiled calcium sulphide, and commercial calcium sulphide reduced the production by 21.3, 23.4 and 70.2 % respectively.

The superiority of Bordeaux mixture as a fungicide for cucumbers and cantaloups could not be more conclusively proved.

G. L. Pavarino. **Bacterial Disease of the *Vanilla Planifolia* Andr. (*Bacterium Briosianum* n. sp.).** Preliminary note. (Batteriosi della *Vanilla planifolia* Andr. (*Bacterium Briosianum* n. sp.) Nota preliminare. — *Atti della Reale Accademia dei Lincei*, Classe di Sc. fis., mat. e nat., vol. XX, fasc. 3°, pp. 161-162. Roma, 16 Agosto, 1911. **2990**

On the *Vanilla planifolia* Andr., cultivated under glass, in the Botanical Gardens of Pavia, the writer found a parasitic disease manifested by blotches of different shape and colour according to the parts attacked, and rapidly spreading to all parts of the plant. **Italy**

By cutting on a level with the blotches, there were found, in the cells adjacent to the healthy tissue, numerous mobile micro-organisms, the activity of which, as far as could be ascertained, takes the form of destruction of the protoplasm amd of more or less marked necrosis of the cell walls.

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(1) Cf. Abst. 1534 and 1535. *Bull.* May 1911. (*Ed.*).

By isolating the micro-organisms and examining the artificial cultures prepared, the conclusion was reached that these micro-organisms belong to a new species (*Bacterium Briosianum* n. sp.) and that they are the agents of the disease observed.

The writer succeeded in reproducing the disease with its natural characteristics by sub-epidermic inoculations.

2991 G. L. PAVARINO. **Bacterial Diseases of the Orchideae. Preliminary Note.** (Malattie causate da bacteri nelle Orchidee. Nota preliminare). *Atti della Reale Accademia dei Lincei.* Classe di Sc. fis., mat. e nat., vol. XX, fasc. 5°, pp. 233-237. Roma, 3 settembre, 1911.

In this preliminary note, the writer describes new bacteria living as parasites on different Orchideæ originating from Rome, or cultivated in the hothouses of the Botanical Garden at Pavia. These new species are :

Italy

Bacterium Cattleyæ n.sp. on the leaves of *Cattleya Warneri* and *C. Harrisoniæ ; Bacillus Pollacci* n. sp. on the leaves of *Odontoglossum citrosmum ; Bacterium Krameriani* n. sp. on the leaves of *Onicidium Kramerianum* and *Bacillus Farnetianus* n. sp. on the leaves and pseudo-bulbs of the *O. ornithorynchum* and the *Cattleya crispa.*

In all cases the writer succeeded in reproducing the disease with the same features as in the original infection.

2992 GUSSOW. **A new Disease of the Lilac** (1). *Journal de la Société Nationale d'Horticulture de France,* 4e Série, T. XII, pp. 380-381. Paris, Juillet, 1911.

M. Gussow reports on a disease of the lilac caused by a bacterium, *Pseudomonas syringæ.* These bacteria, which invade the diseased or mortified tissue, are always mobile, and provided with a flagellum at each end. The leaves and young shoots of the diseased plants are covered with spots, having on their surface an olive-green dust, due to a saprophytic fungus, *Cladosporium herbarum,* the mycelium of which invades the diseased tissues. Mr. Gussow has isolated and cultivated *P. Syringae,* and reproduced the disease by inoculation of a pure culture.

Germany. Netherlands. Great Britain

Pseudomonas Syringae has been described by Bejerinck, who discovered it in the North-west of Germany ; it was then again

(1) Cf. Abst 1017. *Bull.* March 1911. (*Ed.*).

found by Mr. Ritzema Bos in Holland. Mr. Bejerinck made an inoculation of this organism in the apple tree, the pear tree, *Prunus Mahaleb*, buck-wheat, *Atriplex*, and the black poplar. On all these plants *Pseudomonas* causes a disease which Mr. Bejerinck regards as quite identical with that of the lilac.

In some parts of England the disease caused by *P. Syringae*, appears to be frequent. It seems to be found especially in wet localities, and never on isolated individuals. The disease does not seem to have been reported in France.

The branches infected must be cut off and burnt; spraying produces no useful result (1).

L. PAVARINO. **A Canker of the Wistaria; *Bacterium Montemartinii* Sp. Nov.** (Un "cancro" della Glicine; *Bacterium Montemartinii* n. sp.) — *Rivista di Patologia vegetale*, anno V. No. 5, pp. 65-68, I tav. Pavia, 15 Agosto, 1911. **2993**

The Director of the Travelling Lectureship of Piacenza had sent to the Cryptogamic Laboratory of Pavia, some branches of wistaria on which were black, irregular, hollow spots of some extent. Together with the spots there was manifest a process of corrosion, which, after destroying the bark, made its way deep into the woody layers. **Italy**

Under microspic examination, the necrosis of the tissues was manifested by a brown hue, which became darker on the walls of fibres and vessels already deteriorated. Inside those parts which were not yet blackened, a micro-organism was found. The writer isolated and cultivated it, and found it to be a new species of bacterium, to which he gave the name of *B. Montemartinii*. The infection experiments carried out by him proved beyond all dispute that the micro-organism thus isolated is the specific micro-organism of the Wistaria canker.

The author observes that the growth of the disease is favoured by damp, and that the infection is propagated from branch to branch by the liquid, which dripping from the wounds in the infected branches, falls on the sound ones.

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(1) The bacterial disease of the lilac is by no means rare in Great Britain. Dr. Klebahn proved its bacterial origin. In May or at the beginning of June, the still tender shoots often present, at the internodes or on the young leaves, large blackish pustules produced by the bacteria called *Pseudomonas Syringae* Hall, which occupy the inter-cellular spaces. (Cf. G. MASSEE, *Diseases of Cultivated Plants and Trees*, p. 512, London 1910. (*Ed.*).

2994 **Disease of the Euphorbiaceae due to *Leptomonas Davidii*.** (Ziektekiemen in Planten). *Teysmannia*, 22 Jaargang, 5 Aflevering, pp. 324-325. Batavia, 1911.

Dutch East Indies

In some localities in the Dutch East Indies there has recently been reported the appearance of a disease of Euphorbiaceæ caused by a flagellate bacterium, *Leptomonas Davidii*, discovered by Lafont for the first time in Mauritius, in the latex of *Euphorbia pilulifera*. The plants assailed are greatly retarded in their growth, the leaves appear and fall, the stalks turn brown and wither. These symptoms are most clearly manifested in *Euphorbia pilulifera ;* a little less in *hypericifolia*, while *E. thymifolia* has not yet suffered.

2995 France **Calendar for the Control of Vine Diseases and Pests.** — See below, Abstr. 3059.

2996 France **Fungus Diseases of the Viue.** — See below, Abstr. 3058.

2997 **Fungus Diseases of the Vine at Peshawar** (India). — See below, Abstr. 2661.

2998 Italy **Fungi Injurious to the Olive.** — See below, Abstr. 3063.

2999 G. De Michele. **The "Leaf Blotch" of the Olive Tree *(Cycloconium Oleaginum* Cast.)** — *L'Italia Agricola*, anno XLVIII, No. 15, pp. 347-353, 3 fig. Piacenza, 15 Agosto 1911.

Italy: Campania

Mr. De Michele confirms the results of previous experiments, and declares that Bordeaux mixture is the most effective remedy against *Cycloconium oleaginum* in olive trees, although it is sometimes incapable of preventing the fall of the leaves. This latter fact should not be attributed to the inefficacy of the remedy, but to biological conditions special to the plants. The writer found in an olive tree plantation in the Province of Caserta, that all the plants which had not been attacked by root rot had greatly benefited by the sprayings with the Bordeaux mixture, while the plants assailed by the disease (94 were examined) presented the symptom of falling leaves in direct proportion to the quantity of rot found on their roots.

The rot having been extirpated, and the wound disinfected, the plants gradually resumed a thriving appearance, and a timely application of sulphate of copper, proved its entire efficacacy.

Furthermore, the Author observed that the plants attacked by root rot are not only indifferent to sulphate of copper, but benefit very little by any other treatment. He even noted that when the Olive trees are attacked by trunk canker, they lose their leaves very easily, and sprayings with sulphate of copper as well as manuring and every other treatment, have a very limited degree of effectiveness.

The quality of the soil and the lesser or greater degree of humidity also have some influence on the fall of the leaf.

Plants in highly clayey and excessively moist soil, very easily lose their leaves. They are also less susceptible to the beneficial action of Bordeaux mixture against Cycloconium. Having remarked that the vegetation of Olive trees is especially luxuriant on a lime soil, the Author resorted to the application, on a vast scale, of manure, containing lime, and this was not only exceedingly effective on the Olive cultivation, but even imparted to the plants a greater organic power of resistance against *Cycloconium*. Potassic manures gave analogous results.

The experiments made by ihe Author during this year on 1500 Olive trees, in connection with manuring, chiefly with lime and potash, without any copper treatment, resulted in preventing the fall of the leaves, and the crop of fruit promised to be abundant.

It should be noted however that all the trees had been previously pruned in a rational way.

The Author does not mean to say that the sprayings with the copper preparation can be given up, when the Olive trees have been given lime or potash manure, or when they grow on soils of a pronounced calcareous character. On the contrary, with a view to combating the Olive Moth as well, the Author advises adding 700 grammes of arseniate of lead per 100 litres of Bordeaux mixture at the time of the first spraying in the month of April.

Bordeaux mixture is also a remedy against "fumago". For this latter, and at the same time for Cycloconium, Professor Ruby, who had the opportunity of observing tho disease in France, proposes the use of the following solution:

Black soap	1 kg.
Petroleum	4 litres
Sulphate of copper	1 kg.
Water	100 litres

3000 **Fungoid Diseases of Walnut Trees.** — See below, Abstr. 3066.

3001 California ***Cladosporium* sp. on the Stigmata and Styles of Lemon Blossoms, in California.** — See above, Abstr. 2675.

3002 GIOVANNI BRIOSI e RODOLFO FARNETI. **New Researches into the "Ink Disease" of Chestnut Trees and its Artificial Reproduction.** (Nuove osservazioni intorno alla Moria dei Castagni (Mal dell'inchiostro) e sua riproduzione artificiale. Quarta Nota preliminare). *Atti dell'Istituto botanico della R. Università di Pavia*, serie II, vol. XIV, pp. 227-334. Milano, 1911.

The authors have already published (1) the first results of their investigations into the nature of this grave disease of the chestnut Italy tree, to which to-day they make a fresh contribution (2).

They begin by remarking that whatever the mode in which the disease is manifested and the course it takes, the mycelium of the parasite invades both the wood of the branches and that of the trunk, which had hitherto been denied. In particular it makes its way into the vessels, traversing them throughout their length, and thus it frequently happens that it reaches the roots quicker than by the bark, and the necrosis of the latter follows. The mycelium climbs, winds and coils itself against the inside walls of the ligneous vessels to which it adheres, merging in them owing to its transparency, its thinness (1.5 to 2 μ in diameter), and the fact that it is almost completely devoid of transverse partitions, and is marked by the surrounding substances and the glutinous matters which often obstruct the vessels. It happens, though rarely, that a filament of mycelium, crosses the cavity of the vessel, and it can then be seen by means of high magnification, but generally speaking the mycelium passes from one vessel to the other through punctures of the adjoining walls, which makes it almost invisible. This explains why all the writers who have studied the disease in question have always denied the presence of mycelium in the wood.

The authors have furthermore recently noted that in some parts of Italy the disease is complicated in particular by concomitant

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(1) Cf. Abst. 332 *Bull.* Jan. 1911; Abst. 635 *Bull.* February 1911; Abst. 1299 *Bull.* April 1911.

(2) Cf. also *Rendic. della R. Accad. dei Lincei*, Classe Scienze fis. mat. e nat., Vol. XX, ser. 5, pp. 628-633. Rome 1911. (*Ed.*).

parasites (Polypores, Agaricinæ, etc.) In the brushwood in the Serchio valley (Garfagnana) they found for instance on the branches of plants attacked by the "ink disease," bark cankers produced by *Diplodia Castaneæ* Sacc., associated or not with those of *Coryneum perniciosum*, from which several characteristics distinguish them. In the definitive work on the subject in question, the writers will, by means of subsequent investigations, be able to determine whether the presence of *D. Castaneæ* is to be regarded as accidental, or whether it is to be deemed a concomitant cause of the "ink disease." The spread of the disease in the infected chestnut plantations appears to be liable to complications, probably due to the propagation of the contagion by the contact of the diseased roots with the roots of the healthy plants in the same way as the propagation of the root rot usually takes place in arborescent plants.

As regards the results of the investigations, no doubt remained as to the parasitic character of *Coryneum perniciosum* and its most developed forms, and it was likewise beyond doubt that this parasite is the efficient cause of the "ink disease;" all that was needed was experimental proof, but this could not be obtained except by artificial reproduction of the malady. The experiments were begun towards the end of spring 1909, on a big chestnut tree more than 30 years old in full growth in the Botanical Gardens at Pavia. It stood alone on a wide plain where the chestnut tree is not specially cultivated, and which is moreover situated some hundreds of kilometres from the nearest centres of infection. The experiments were repeated in 1910 on young plants from a nursery at Mariano Comense, specially transplanted to the Botanical Gardens at Pavia. The authors intend to give account elsewhere of the results of these last experiments, the artificial reproduction of the disease being only in its inception.

The reproduction experiments were carried out by the method of direct inoculation of the spores of the conidial (*Coryneum perniciosum*) and ascophorous (*Melanconis perniciosa*) form, taken in part from the pustules of the diseased plant in the environs of Savona, and in part from pure cultures of the parasite.

In March 1911, on the bark of the trunk of the tree in the Botanical Gardens, in the part where the inoculations had been made, an abundant eruption of pustules suddenly appeared; the external aspect and microscopic examination proved that they were formed by the stromas of *Coryneum perniciosum*, which had lifted and pierced the bark. This eruption extended from a height of a few centimetres to 2.20 metres above the ground level. The inoculated parasite

has consequently been reproduced very abundantly by spores which up to now have presented only a conidial form.

The tree presents the characteristic symptoms of the "ink disease" in its gravest form, that is, in the form of apoplexy, because the entire covering of the tree has dried and the leaves as well as the fruits have remained abortive on the branches. On examining the tree attentively, its trunk is seen to be dead almost down to the level of the ground. The morbid process which had begun by extending upwards, in April last showed a tendency to descend rapidly towards the roots, as occurs in the natural infections observed in Chestnut trees at Cadibona and in the Sella thicket near Savona.

The injections having been carried out with the utmost care it may be said without fear of error that the reproduction of the disease is solely due to *Coryneum*, every other predisposing or determining cause being excluded; nor could the slight shock of the needle of the syringe have constituted a traumatic cause with any effect.

The disease only appeared one year after the inoculations, reproducing the form hitherto considered the most mysterious and inexplicable, namely, the apoplectic, with all its special characteristics, that is to say, premature withering of the leaves, mummification of the fruits, which do not separate from the branches, retarded formation of the reproductive organs of the parasite, etc.

3003 **Chestnut Canker (*Diaporthe parasitica*) in the United States.** (Virulence of the Fungus). — *Agricultural News*, Vol. X, No. 234, pp. 113-114. Barbados, April 15, 1911.

The outbreak of canker on the chestnut trees of the United States only attracted attention in the year 1904, but has now become a serious epidemic, so far impossible to control. The disease
United States is due to a wound fungus identified as *Diaporthe parasitica*, Murril, which lives in the inner bark and cambium of the stem and all woody branches of the chestnut.

On limbs with smooth bark, the parasite produces pale brown, sunken patches on the outer bark. These become more or less thickly covered with the orange yellow or reddish brown pustules of the fungus, which break through the lenticels. In a damp atmosphere, the summer form of spore is extruded in a yellow or greenish tendril, which becomes brown as it grows older. The fungus grows so fast that it can completely girdle a branch or small trunk, and

thus kill it, in from one to two years. Even large trunks are girdled as a rule in four years.

The native American chestnut (*Castanea Dentata*) is the plant most subject to attack, but the chinquapin (*Castanea pumila*) found native from New Jersey to Florida, is also affected, while the disease has been found also on the Japanese chestnut (*Castanea crenata*). Indeed, it is suggested that imported plants of this foreign variety growing on Long Island may well have served as the original source of the disease.

This point has not, however, been definitely established. All the preventive measures tried within the area of serious infection have failed entirely.

At the present time, practically every tree within the infected area is doomed, while the possibility of the complete destruction of the native American chestnut and of the chinquapin must be faced. This destruction represents a loss of economic products valued at several hundred million dollars.

Cocoa-nut Bud-rot. — See above, Abstr. 2692. 3004 Philippines

DOROGUINE. **A Disease of *Pinus Montana* due to *Cytosporina Septospora* sp. nov., Observed near St. Petersburg**. (A cryptogamic disease of the Pine). Extr. du *Bulletin de la Société Mycologique* de France, T. XXVII, 1er fasc., 2 pp. figg. Paris, 1910. 3005

The author in the summer of 1910 observed yellow spots on the normal green of the needles of a pine (*Pinus montana* Mill.), in the park of the Forest Institute at Lesnoj, near St. Petersburg; these blotches sometimes covered ¼ to ½ the surface of the needle. Russia

On the blotches the writer remarked small dark tubercles produced by the stromatic body of a new parasitic fungus which he thinks may be included in the genus *Cytosporina*, under the name of *C. septospora* sp. nov., if the diagnosis of this genus be widened by admitting that the stylospores may sometimes be pluricellular.

F. W. NEGER. **Combating the Oak "White"** (1). (Die Ueberwinterung und Bekämpfung des Eichenmehltau). *Tharander Forstliches Jahrbuch*, 62 Band, 1 Heft, pp. 1-9. Berlin, 1911. 3006

The writer reports on a series of experiments carried out in Germany in the forest reserves near Berlin, to determine what are the most suitable fungicides for combating the "white" of the oak. Germany

(1) Cf. Abst. 1298 *Bull.* April 1911.

Sulphur sprayings and washings with a nixture of sulphur and lime were carried out. The latter gave the most effective and practical results, Especially, when used concentrated to 1:20; while simple applications of sulphur in powder yielded unsatisfactory results.

Injury to Lumber by Fungi. (1) — *Scientific American*, Vol. CV, No. 7, p. 143. New York, August 12, 1911.

Blue and black stains on lumber stored in yards decrease its value, without, however, injuring the wood, since it has been found that the fungi which cause the stains feed upon the materials within the cells of the sap-wood, and do not destroy the fibres. These fungi are largely of the black-knot family, and the most common are species of *Graphium* and *Ceratostomella*. It has been the custom of lumber companies to dip the wood in solutions of sodium carbonate or bicarbonate immediately after the sawing; but the results have been very uncertain. In order to find out why the alkaline solutions sometimes prevented the development of the fungi and at other times had no effect whatever, Miss Caroline Rumbold started a series of experimental cultures at the Missouri Botanical Garden in St. Louis.

Nutrient media were prepared containing from one-half to two per cent of sodium carbonate, and others with similar amounts of citric acid. The spores of *Ceratostomella* germinated and the fungus throve on the acid media, and on those containing 0.5 per cent of Na_2CO_3, but not on those with 1 per cent. more of the alkali. Freshly cut sap boards of yellow pine and red gum were then dipped in hot and in cold solutions of sodium carbonate and of sodium bicarbonate, of various strengths, from 1 to 10 per cent. These boards were inoculated with the spores of the fungus, and kept in chambers with a saturated atmosphere. Controls were simply dipped in water, and some of the red gum boards also in sulphuric acid (5 and 10 per cent). The fungus developed on all the controls including the sulphuric acid boards, and on most of the boards dipped in the alkaline solutions. The hot dip was found to be more effective in preventing the growth than the cold solution, and the carbonate of 7 to 8 per cent as effective as the bicarbonate solution of 8 to 10 per cent.

(1) See also Abstr. 1301 *Bull.* April 1911 and Abstrs. 1930-1931 *Bull.* June 1911. (*Ed.*).

PERLEY SPAULDING. **The Timber Rot Caused by *Lenzites sepiaria*.** 3008
— *U. S. Deptm. of Agriculture. Bur. Plant Industry Bull.* No. 214 pp. 37. Washington, July 21, 1911.

The value of the total timber and wood cut in the year 1908 in the United States was slightly more than 1 000 000 000 dollars, about $^3/_4$ of this production being supplied by the coniferous species of trees. United States

Lenzites sepiaria is one of the most important of the fungi which attack coniferous species of wood. It alone probably destroys nearly $^1/_4$ of these timbers. The latest statistics show that coniferous railroad ties and telegraph and telephone poles bought in 1908 cost 32 500 000 dollars, making an annual item of more than 8 000 000 dollars worth of timber which has its length of service seriously shortened by this fungus.

Lenzites sepiaria is widely distributed, being prevalent throughout Europe, in Australia, in the East Indies and in South America. In North America it is undoubtedly present throughout Canada to the northern tree line, everywhere in the United States, and at least in the coniferous forests of Mexico. It occurs on the wood of Populus, Salix, Alnus, Abies, Larix, Picea, Pinus, Tsuga, Pseudotsuga, and Juniperus. It is a saprophyte, but under certain conditions can attack wood that is apparently alive. It usually enters timbers through season cracks, and under favorable conditions is able to form mature sporophores within 5 months' time on newly cut timber. The fungus has been known in Europe for many years, being easily traced back to 1786. The sporophores are rather small, usually occurring in groups or fusing laterally. They may revive after long periods of desiccation, the writer having obtained spores from specimens after two years. Hence, decayed timber should be destroyed as it is a prolific source of infection for new timber. Mature sporophores may be produced within 6 to 10 days after the first mycelium shows on the exterior of an affected timber. Many pure cultures have been made by the writer, usually using the living mycelium instead of spores for inoculation. Inoculations into green timber produced sporophores within five months in Texas.

The decayed wood is brown in colour, irregularly fissured into tiny cubical masses which crumble into dust between the fingers.

Microchemical tests show that the lignin has lost some of its constituents and is disintegrated. Pure cultures grown upon sterilized green wood have produced the decay which constantly accompanies the fruiting bodies in the field and forest.

The factors governing the growth of wood-rotting fungi are food, air, water, and temperature. These fungi cause decay by disorganizing the wood tissues in which their mycelium vegetates, and the above factors which govern their growth consequently govern the decay caused by them. Hence, the decay caused by *Lenzites sepiaria* may be prevented or greatly retarded:

1) by seasoning, which decreases the water content of the timber to such a point that fungi can not readily grow;

2) by floating, which excludes the air and probably has some effect on the food materials within the timber; and

3) by chemical treatment, which infiltrates the wood with substances deleterious to the fungi. The experiments of Von Schrenk (*Report on the Condition of treated Timbers laid in Texas, February 1902. Bureau of Forestry, U. S. Dept. Agr. Bull.* 51, pp. 13-20. Washington, 1904) showed that creosote, zinc tannin, zinc creosote, and zinc chloride are efficient in the order named. The Barschall process, in which a mixture of copper, iron and aluminium compounds is used, was not satisfactory. The Beaumont oil and "spritine" were hardly satisfactory, but were applied in open vats without pressure. The Wellhouse and the Allardyce (1) processes gave satisfactory protection.

The Bulletin under review is illustrated by 4 plates. A bibliography of 215 papers is appended.

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(1) A solution of zinc chloride containing a small amount of glue is first injected and then a solution of tannin. The latter forms small particles of artificial leather which are insoluble in water and are supposed to stop up the vessels and cause the retention of the zinc salts (J. BEAUVERIE, *Le Bois*, p. 716. Paris, 1905).

Phanerogamous Parasites and Weeds. — Their Control.

G. D'Ippolito. **Measures for Repelling the Invasion of Italy by the *Cuscuta Arvensis* Beyr.** (1). (Contro l'invasione della *Cuscuta arvensis* Beyr.). *Il Villaggio*, Anno 36, No. 1827, p. 315. Milano, 1 Luglio, 1911. 3009

Until very recently the gravest infection which threatened the meadows of leguminosae in Italy was that of the *Cuscuta Trifolii*. A more dangerous parasite has recently appeared; it is *Cuscuta arvensis* Beyr., which seems to have been imported from America with Lucerne seeds. Italy. United States

C. arvensis, the seeds of which are bigger than those of *C. Trifolii*, cannot be separated like the latter by the sieves usually employed against dodder. Sieves must be used with meshes of 1¼ mm. diameter. *C. arvensis* causes more serious damage than *C. Trifolii*; either because its seeds possess greater germinating power, or because it stifles the clover before the time of the first mowing, while *C. Trifolii* does not appear until the second mowing.

H. C. Long. **Seeds Produced by Weeds. Weeds and their Destruction.** — *Trans. of the Highland and Agric. Soc. of Scotland*, vol. XXIII, pp. 51-52. Edinburgh, 1911. 3010

As already stated, weeds in many cases produce enormous quantities of seeds in order to ensure a sufficient number of pro- Great Britain: Scotland

(1) Cf. p. 169 *Bull.* Nov. 1910: Abstr. 337 *Bull.* January 1911; Abstr. 1553 *Bull.* May 1911; Abstr. 1936 *Bull.* June 1911 and Abstr. 2316 *Bull.* July 1911. (*Ed.*).

geny. The numbers of seeds produced by certain weeds are given below:

Weed	No. of Seeds
Charlock, *Brassica* (*Sinapis*) *arvensis*. . .	1 192 — 4 000
Shepherd's purse, *Capsella bursa-pastoris* .	4 500
Cleavers, *Galium Aparine*	1 100
Chickweed, *Stellaria media*.	500
Groundsel, *Senecio vulgaris*	300 — 20 000
Dandelion, *Taraxacum officinale*	3 153 — 5 400
Ox-eye daisy, *Chrysanthemum Leucanthemum*	1 300 — 26 000
Scentless mayweed, *Matricaria inodora* . .	37 478 — 310 000
Coltsfoot *Tussilago Farfara*	5 000
Corn marigold, *Chrysanthemum segetum* .	13 500
Burdock, *Aretium sp.*	24 520
Wild carrot, *Daucus Carota*	1 200 — 110 000
Fool's parsley, *Æthusa Cynapium*.	600 — 6 000
Poppy, *Papaver sp.*	50 000 — 60 000
Broom-rape, *Orobanche sp.*	Many thousands
Ribwort plantain, *Plantago lanceolata*. . .	2 500 — 15 000
Field bindweed, *Convolvulus arvensis* . . .	600
Goosefoot, *Chenopodium sp.*	3 123

The figures quoted are all authoritative, though from various sources, and serve to show the prodigious number of seeds produced by some weeds. Recognising the facts, one need no longer be surprised at the rapid increase of weeds on neglected farms.

Vitality of Seeds,

Not only are weeds prolific, but in many cases their seeds possess very considerable vitality, retaining their power of germination for some years. An example commonly quoted is charlock, the seeds of which have been shown by Professor Peter of Göttingen to retain their germinative capacity for forty years, especially when they lie at considerable depths in the soil,

The number of weed-seeds often present in ordinary soil is astonishing. In May 1909 the writer measured off a square yard of a good garden soil and removed all seedlings by hand, counting them and dividing them roughly into species. The total amounted to 1050 (or 5 082 000 per acre), among them being 654 buttercup, *Ranunculus sp.* seedlings, 107 of annual meadow-grass, *Poa annua*. 60 of dock, *Rumex sp.*, 26 of goosefoot, 25 of groundsel, 15 of shepherd's purse, 14 of annual sow thistle, *Sonchus sp.* and 10

chickweed, besides 39 other species. Korsmo's investigations revealed the presence of even larger numbers of seeds having the power of germination, the seeds per square yard to a depth of 9.8 inches being as follows:

Fallow field, 8 682 weed-seeds (over 42 millions per acre);

Field for spring grain, bearing the same crop for four successive years, 28 213 weed-seeds (over 136 millions per acre);

Fallow field, 1474 weed-seeds (over 7 millions per acre).

3011

J. S. Cates. **The Eradication of Quack-Grass *(Agropyron repens).*** — *U. S. Department of Agriculture. Farmers' Bulletin* 464, p. 11. Washington, 31 August 1911.

United States

After completing the studies of the rootstock habits of quack-grass under different field conditions, experimental work was undertaken with the idea of discovering a practical method for the control of this pest. That quack-grass can be destroyed by persistent clean cultivation is well recognized; that the grass in its worst form (where infesting a cultivated field) can be killed in one season and a crop produced simultaneously has been demonstrated.

The process of killing quack-grass on sod or pasture lands, beginning in midsummer, is a very simple one.

The first step is to plough the sod, cutting just under the turf, which is usually about 3 inches deep. To thoroughly turn over a stiff quack-grass sod as shallow as 3 inches it is advisable to use a special type of plough (Scotch bottom) having a very long, gradually sloping mouldboard. It has been found that with this type of plough the sod can be turned very shallow. After a week or ten days a disk harrow should be used and the sod thoroughly disked. Repeat this treatment every ten days or two weeks until fall, when the quack-grass will be completely killed out.

It sometimes happens that with certain kinds of soil during drier periods in the summer the ground becomes too hard to plough. With the type of plough suggested, however; it has been found that very hard and dry sods can be turned. In case it is not possible to turn the sod on account of dry weather, the treatment can be given with the disk harrow alone. The author has been able to thoroughly kill the grass with either the disk or the combination of plough and disk treatment. Where ploughing is possible, however, it is usually cheaper to kill the grass with plough and disk than with the disk alone.

3012
United States. Ceylon

Dry-Farm Weed Exterminator. — See above, Abstr. 2945.

3013 Japanese Empire: Formosa

***Laportea pterostigma*, Injurious Plant of Formosa.** — See above, Abstr. 2717.

3014 N. Zealand

***Myoporum laetum* of New Zealand, Suspected Poisonous Plant.** — See above, Abstr. 2760.

Insects and other Injurious Invertebrates Their Biology and Control.

3015

Recent Publications of Economic Entomology. — *Nature*, No. 2182, vol. 87, p. 230-231. London, August, 17, 1911.

United States: Barbados Trinidad

Mr. F. M. Webster has recently published a paper on the alfalfa weevil (*Phytonomus murinus* Fab.), a pest introduced into the United States from Europe or North Africa some 6 years ago, and now spreading somewhat widely in Utah (1). Another paper by the

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(1) Cfr. E. G. Titus, The « Alfalfa Leaf Weevil ». *Utah Agric. Coll. Exp. Sta, Bul.* No. 110, pp. 19-72. Logan, Utah, September 1910. The synopsis of this bulletin is as follows: The « Alfalfa leaf weevil » (*Phytonomus murimus*) is a small, oval, brown snoutbeetle (*Coleoptera, Curculionidae*), about 3/16 of an inch long, that is attacking alfalfa in Utah, where it came from Europe. It feeds on leguminous plants, injuring all parts of the plant above ground. The eggs are laid in the spring and early summer in the stems or on the buds and leaves, and hatch in about 10 days. They feed on, and in the leaf buds, in the stalks, and on the leaves. The fully grown larvae, about 50 to 60 days after hatching, go to the ground and spin round themselves a lace-cocoon, in which, in about 14 days, they turn into the adult. This adult feeds on the stems, leaves and buds for several weeks, and in August goes into hibernation for the winter, seeking any well sheltered place.

The insect now occurs in Salt Lake, Davis, Weber, Morgan, Summit, Wasatch, Utah and Tooele counties, and threatens to eventually reach all the alfalfa growing regions of the Utah State. It spreads rapidly in the adult stage.

same Author deals with the « lesser-clover leaf weevil » (*Phytonomus nigrirostris* Fab.), an insect introduced into the United States probably 50 years ago, but not very common even yet ; it suffers from at least two parasites, a small Tachinid and a fungus, *Empusa sphaerosperma*. The « Broadnosed grain weevil (*Caulophilus latinasus* Say) is described by F. H. Chittenden, and also the « Long headed flour beetle » (*Latheticus oryzae* Waterh.) ; both are found in stored cereal products. and may become serious pests if they succeed in establishing themselves.

The ravages of the « Codling moth » (*Carpocapsa pomonella* L.) in California are dealt with by S. W. Foster ; two full broods of larvae could be traced during the season, the first, however, being relatively small, and often overlooked. Treatment with a lead-arsenate spray is recommended. The « Grape leaf hopper » (*Typhlocyba comes*, Say) an insect causing damage to vines in the Lake Erie Valley, is shown by F. Johnson to yield to a nicotine spray. Three pests on crops are dealt with : the « Timothy stem-borer » (*Mordellistena ustulata*, Lec.), a pest which has recently been observed by W. j. Phillips ; the « Sorghum midge » (*Contarinia sorghicola* Coq.), described by W. H. Dean ; and the « Maize billbug » (*Sphenophorus maidis* Chittn.), by E. O. G. Kelly. The « Alfalfa caterpillar » (*Eurymus eurytheme* Boisd.) is dealt with by V. D. Wildermuth ; it is very common and does a good deal of damage in various localities. A bulletin by D. O. Howard sets out various remedies against mosquitoes. The best mixture for keeping them off was found to be 1 part of oil of citronella, 1 of spirit of camphor, and ½ of oil of cedar ; a few drops sprinkled on a towel and hung over the bed will keep mosquitoes away during the night. For the actual bite the most satisfactory remedy is said to be moist soap. Traps are described, and methods for the destruction of the insects over both large and small areas are set out.

It is recommended that alfalfa be disked in early spring to stimulate its growth. The first growth should be cut when most of the eggs have been laid (middle of May) and then the field thoroughly brush-dragged. Sheep may be pastured on the fields at this time for two weeks, and the alfalfa then watered, and a good crop will usually be assured. Gathering machines to capture the larvae and beetles have given good results when used on the fields at the time the insects are most numerous. Fields should be brush-dragged again after the first crop has been cut. All weeds and rubbish should be removed from fields, yards, ditches and fence rows. Alfalfa should not be allowed to grow more than 7 or 8 years in infested districts. (*Ed.*).

In Barbados the hymenopterous parasite *Zalophothrix mirum* Craw. was able to keep in check the « Black scale » insect (*Saissetia nigra* Nietw.), whilst in St. Vincent it was not so effective.

Investigators were recently sent from the United States to Panama to search for parasites of the « Citrus white fly » (*Aleyrodes citri*) of the « Cotton boll weevil » (*Anthonomus grandis*) and allied species.

A well-illustrated bulletin has recently been issued by P. L. Guppy on the life-history and control of the « Cacao beetle » (*Steirastoma depressum* L.). which for some years past has been a serious pest and a source of trouble to planters in Trinidad. Hitherto nothing definite seems to have been worked out in regard to its life-history, and its habits have only been superficially observed. Mr. Guppy's publication supplies much useful information on the insect.

3016 **Entomological Papers.** — *Nature*, No. 2174, Vol. 86, pp. 598-599. London, June 29, 1911.

Canada. Great Britain. Brazil

According to the Report of the Dominion Entomologist, Dr. C. G. Hewitt, issued in the Annual Report of Experimental Farms for 1909-10, Ottawa, a new Destructive Insect and Pest Bill was introduced during the period under review into the Canadian Parliament (1). The necessity for such legislation, owing to the rapidly increasing volume of foreign trade, was pressing, as it was essential to provide means against the introduction, or reintroduction of such pernicious species as the San José scale (*Aspidiotus perniciosus*) and woolly aphis (*Schizoneura lanigera*) and the "brown-tail" and "gipsy" moths (*Porthcria dispar* and *Euproctis chrysorrhoea*). The brown-tail moth, introduced some years ago, is still the most important enemy against which the Entomological Department has to fight, and it is essential that every possible means should be taken to prevent its spread, as otherwise the financial and other losses caused by its devastations will be appalling. It is satisfactory to learn that there were no serious injuries caused during the year by insects harmful to cereal crops, which form the staple of Canadian agriculture.

The Rev. F. D. Morice continues his notes on British saw-flies (Tenthredinidae) in the May issue of the *Entomologist's Monthly Magazine*.

Dr E. Goeldi is communicating a very interesting series of articles on ant-colonies to *Himmel und Erde*. In the May number

(1) See below, Abstrs. 3089-3091.

he illustrates the manner in which the various kinds of ants inhabiting the flooded lands of Amazonia make their nests in trees, so as to be above the water-level, figuring the long, pendant, skein-like nests of *Azteca barbifex*, the torpedo-like structure formed by a species of *Camponotus*, and the sheet-like *papier-maché* nest of *A. trigona*. Fungus-growing ants are likewise described, with striking illustrations of the crater-like elevations, leading to the subterranean chambers, to be seen in sandy districts of certain parts of America. To these the ants bring fragments of leaves from long distances, and, after storing them in subterranean chambers, use them as hot-beds for the cultivation of the mycelium stage of the fungus *Rhozites gongylophora*. Whether the fungus, in its fully developed state, ever reaches the surface through one of the entrance-tubes is a moot point.

In No. 1830 of the Proceedings of the U. S. National Museum Mr J. C. Crawford continues his descriptions of new Hymenoptera. The types of several of the fifteen species named were forwarded by correspondents of the Bureau of Entomology, and as these species are of interest in connection with economic entomology, the descriptions were published at the earliest possible date.

Attention may be directed to the description by Mr. J. H. Keys in the June number of the *Entomologist's Monthly Magazine* of a new species of British weevil (*Barypithes duplicatus*), on account of the apparent absence of any allusion as to what constitutes the type. It is even left uncertain whether a spot between Broadstairs and Margate, Blean Woods, Kent, or some other place is the type-locality.

E. I. Woodhouse and H. L. Dutt. **The Insect Pests of the Mokameh-tal (Bengal).** — *Department of Agriculture, Bengal Quarterly Journal*, Vol. IV, No. 4, pp. 198-213. Calcutta, April 1911. **3017**

The farming experiments of 1910 have proved that the *Agrotis Ypsilon* occasions considerable damage to the "Tal" lands round about Mokamed. The area of soil exposed to its attacks totals 40 square miles (104 square kilometres). Two generations per year of this insect are produced, and it is the second which causes the damage in question. **Brit. India: Bengal: Mokameh-Tal**

Its activity is exerted during about four months from December to March. The damage is caused by the larvae; they cut the stalks of the young plants level with the ground during the night and conceal them between the earth clods to feed on them.

The only plants which the caterpillars do not eat are two species of weeds "Hurrur" (*Cleone viscosa* and *Gynandropsis pentaphylla*). The best method of effectively combating the pest seems to be the destruction of the first generation, which is small and makes its appearance at the beginning of the season.

Prodenia littoralis appeared also in 1910, in the form of an occasioual disease.

Its pathogenic action is evolved between March and November, and the damage is caused by the caterpillars, which tear off the leaves of the plants on which they feed.

It would be possible, nay easy, to keep this pest in check, if the great masses of eggs were carefully collected and destroyed.

3018 J. G. GROSSENBACHER. **Medullary Spots; A Contribution to the Life History of some Cambium Miners.** — *New York State Sta. Tech. Bull.* 15, pp. 49-65 pl. 5. — E. S. R. Vol. XXIV, No. 6, p. 561. Washington, May, 1911.

United States

In studying the life history of a fungus which causes a browning of currant bushes (*Ribes vulgare*), dark brown bands are often observed on the young stalks at the end of the summer. Bands or galleries of the same kind have been found in Europe on the black currant (*R. nigrum*) and the gooseberry bush (*R. Grossularia*). During the summer of 1910, grubs collected from *Ribes* showed that the insects in question were the caterpillar of the "Tineid moth" (*Opostega monstrigella*).

The studies of the writer result in showing that the eggs are laid in or on the bark of the *Ribes* between the beginning of April and the middle of May, and that the grub galleries in the cambium are furrowed in 4 to 6 weeks, while the nymph stage occurs in the ground, and seems to last 2 to 3 weeks, ending on the 10th June. It was observed that the adults appearing in June and July, live throughout the winter. Possibly therefore some nymphs winter in the soil and appear in the following spring. Numerous empty cocoons having however been found on the ground in August, the author deems it possible that there is a second generation feeding on the cambium of different species of plants, which enables them to live actively till the end of the summer.

Galleries were found both in the young and old stalks of *Ribes*, from top to bottom of these plants. In *R. nigrum*, the year-old stalks are more usually attacked; but in *R. vulgare* and *R. Grossulalria* those of the current year.

These insects deserve attention, because the galleries they bore are favourable to the action of a fungus causing the death of the gooseberry bush. " The direct attack of this insect on currant and gooseberry bushes is probably not grave ; and that of the " Cambium Miners " is probably still less so to plum trees, cherry trees etc., owing to the disproportion between the damage caused and the size of these plants ".

The writer gives a technical description of the larva, cocoon, and the perfect insect, and also information about the histological modifications produced by these galleries. There are likewise some brief observations on the " Cambium Miners " of *Prunus* and *Crataegus*.

HENRI COUPIN. **New Fungus-Growing Insects.** (Nouveaux Insectes champignonnistes). — *La Nature*, 39e Année, 2e Sem., No. 1936, p. 193. Paris, 26 Août 1911. **3019**

The curious case of ants which actually cultivate fungi and establish breeding grounds where their larvae find abundant food, has long been known. For some little time too, the case of the Termites has been known, in which the fungi which grow in their huge dwellings, play an important part as food. It is interesting to observe that these two examples are not isolated, as Mr. J. Beauverie has just proved by collecting the scattered works of his predecessors, and adding an important contribution. On examining the walls of the cavities mined by the Coleoptera of the group of Bostrychidae in the wood of our trees or those found in the galls of the flies of the genus *Asphondilia*, a sort of white crust is found which, to the first observers, seemed to be a simple saline excretion which was designated by the name of « ambrosia ». Not until 1844 did Hartig perceive that this supposed saline crust was in reality a fungus, and that the brown colouring of the walls of the cavities was due to its presence. **France**

The said fungus — there are in reality several species which Mr. J. Beauverie has studied — is not a simple mould, that is to say, useless or even injurious to the insect. It is in reality very useful, because it forms a healthy and plentiful food for the larvae.

The fungi in galleries of the Bostrychae serve the purpose, as it were, of draining out the albuminoids in the wood and thus bringing them withim reach of the larvae.

It is observed furthermore, that the Bostrychae only mine fairly fresh wood and sap wood, because only under these conditions does

the fungus find the necessary water and food for its growth, as well as a sufficient ventilation. These conditions are so well adapted to the fungus that the coating it forms really represents a pure culture.

The first spores of the fungus seem to be brought by adult insects, whether existing on the surface of their body or deposited together with their dejecta. Evidently the sowing takes place independently of the will of the animal, but both nevertheless profit by their association. It is a genuine symbiosis, because the fungus though « browsed » in situ, is, owing to the action of the insect, placed in a very favourable medium, and on the other hand the insect finds in its companion, a sufficiently soft food for its feeble jaws.

3020 O. F. Cook. **Relation of Drought to Weevil Resistance in Cotton.** — *U. S. Dept. Agr. Bur. Plant Industry. Bull.* N. 220, pp. 30. Washington, August 7, 1911.

United States: Louisiana Mississippi

Weevil-resisting characters and methods of cultivation are more useful in dry regions or in dry seasons, because the propagation of the weevils (*Anthonomus Grandis*) is less rapid and the weevil-resisting factors are effective for longer periods. Wet weather not only favors the rapid multiplication of the weevils, but also interferes with the application of cultural expedients for avoiding weevil injury. Even the weevil-resistant characters of earliness, quick fruiting, and determinate habits of growth are likely to diminish or to diseappear when the plants are grown under extreme conditions of heat and humidity.

The problem of weevil resistance is especially acute in the humid bottom lands of Louisiana and Mississippi, the chief centres of production of the long staple « Upland » varieties. Earlier maturing long-staple varieties that have been bred in the United States or acclimatized from abroad may replace the present long-staple varieties whose late-maturing habits render them more susceptible to injury by the boll-weevil, especially when grown in the same localities with early short-staple varieties. Two additional measures of weevil resistance are also worthy of careful consideration in humid regions, the development of quick-fruiting long-staple varieties and the better organization of cotton-growing communities, so that only one type of cotton shall be grown in the same locality. The exclusion of earlier short-staple varieties would at the same time help to maintain the uniformity of the crop by avoiding cross-pollination

by bees and admixture of seed in public gins. In the breeding of weevil resistant varieties the rapidity of fruiting, after fruiting has once commenced is more important than absolute earliness, as shown by the dates of the first flowers or the first open bolls. The setting of a crop of bolls in the shortest time after the flower buds begin to appear, is the ideal form of earliness from the standpoint of weevil resistance.

Boll-Weevil Resistant Varieties of Cotton. — See above, Abstr. 2573. 3021 United States

Pruning Mulberries close to the Ground to protect them against *Diaspis pentagona*. — See above, Abstr. 2697. 3022

L. O. Howard and W. F. Fiske. **Parasitism as a Factor in Insect Control. Rate of Increase of the Gipsy Moth in New England.** (1) (The Importation into the United States of the Parasites of the Gipsy Moth and the Brown-tail Moth). — *U. S. Dept. of Agric., Bureau of Entomology.* — *Bulletin* No. 91. pp. 312, pls, XXVIII, fig. 74. Washington, 1911. 3023

In studying native American Lepidoptera liable to cause defoliation of trees, it has been found that each insect has a great variety of parasites, differing in natural affinities and methods of attack. Consequently, it is believed that the successful conclusion of the experiment in parasite introduction now under consideration depends upon the establishment of an effective sequence of such parasites. United States

In their native countries, insects are subjected to a certain fixed percentage of parasitism and other agencies. Of these, destruction by weather conditions may be classed as "catastrophic", as the percentage of destruction remains the same whatever the abundance of the insect. Destruction by birds and other predators tends rather to diminish proportionally as the number of the insects increases. Disease does not usually set in till the larvae have become abnormally abundant; excessive abundance brings the greatest check of all: famine and starvation. But parasites play the most important part in preventing excessive abundance, in that

(1) See also Abstr. 1568 *Bull.* May 1911. (*Ed.*).

they tend to increase with the increase in number of their hosts; this state of affairs the writers name "facultative parasitism".

"The best information available as to the rate of increase of the gipsy moth actually prevailing in Massachusetts is contained in the report entitled "The Gipsy Moth", by Mr. Edward H. Forbush and Dr. C. H. Fernald, which was published under the direction of the Board of Agriculture. These authorities, in their discussion of the matter, say as follows:

The study of the increase and dissemination of the gipsy moth in Massachusetts is most interesting. Perhaps there never has been a case were the origin and advance of an insect could be more readily traced. As the moth appears to be confined as yet to a comparatively small area, and as the region has been examined more or less thoroughly for five successive years, the opportunities offered for the study of the multiplication and distribution of the insect have been unequalled.

When it is considered that the number of eggs deposited by the female averages from 450 to 600, that 1 000 caterpillars have been seen to hatch from a single egg cluster, and that at least one egg cluster, has been found containing over 1 400 eggs, there can be no doubt that the reproductive powers of the moth are enormous. Mr. A. H. Kirkland has made calculations which show that in eight years the unrestricted increase of a single pair of gipsy moths would be sufficient to devour all vegetation in the United States. This, of course, could never occur in nature, and is mentioned here merely to give an idea of the reproductive capacity of the insect.

It seems remarkable at first sight that an insect of such reproductive powers, which had been in existence in the State for 20 years, unrestrained by any organized effort on the part of man, did not spread over a greater territory than 30 townships, or about 220 square miles. Some of the causes which at first checked its increase and limited its diffusion in Medford have already been set forth. Most of the checks which at first served to prevent the excessive multiplication of the gipsy moth in Medford operate effectively to-day wherever the species is isolated. True, it has now become acclimated. But any small isolated moth colony still suffers greatly from the attacks of its natural enemies and from the struggle with other adverse influences which encompass it. The normal rate of increase in such isolated colonies as are found to-day in the outer townships of the infested district seem to be small. The annual increase can be readily ascertained by noting the relative number of egg clusters laid in successive years, the unhatched or latest clusters being easily distinguished from the hatched or "old" clusters,

and the age of these latter, whether one, two, three, or more years, being indicated by their state of preservation. The ratio of the average annual increase of 10 such colonies was found to be 6.42; that is, six or seven egg clusters on an average may be found in the second season to one of the first season,

"If the number of eggs deposited by the average female moth be set at 500, and if the sexes of her progeny are equally divided, a potential increase of 200-fold for each annual generation is provided for. Under complete control only one pair of moths would average to be produced from each mass of eggs deposited, and since each egg represents an individual embryo, all but 2 of each 500 must fail to reach full maturity. Reduced to percentage, this is equivalent to the survival of 0.4 per cent and the destruction of 99.6 per cent of the gipsy moths in one stage or another every year. Since the total number of gipsy moths in any locality can not possibly be computed, the only method by which mortality through any cause may be expressed is on this basis.

"It will surprise many who have not given the matter consideration to learn what an extraordinary apparent mortality it requires to offset a potential increase of 250-fold. The gipsy-moth caterpillars moult five or six times after they hatch and before they change to pupae, making the number of caterpillar stages six or seven. If through natural controlling agencies 50 per cent of the young caterpillars were destroyed in the first stage before they had moulted, and this was followed by similar destruction of another 50 per cent in the second stage, and so on through the third, fourth, fifth, sixth, and seventh stages, respectively, and in addition 25 per cent of the pupae and 25 per cent of the adults before depositing their eggs were similarly destroyed, it would still permit of a slight annual increase.

"The following table (if the incongruity of fractions as applied to insects may be overlooked) indicates the number of survivors of each stage resulting from the hatching of a mass of 500 eggs:

	Stage	Number	Loss per cent	Number remaining	Potential increase	
Eggs		500	0	500	250	fold
Caterpillars	First	500	50	500	125	»
Do	Second	250	50	125	62	»
Do	Third	125	50	62	31	»
Do	Fourth	62	50	31	15.5	»
Do	Fifth	31	50	15.5	7.75	»
Do	Sixth	15.5	50	7.75	3.875	»
Do	Seventh	7.75	50	3.875	2.906	»
Pupae		3.875	25	2.906	2.179	»
Adults		2.906	25	2.179	1.634	»

3024 L. O. Howard and W. F. Fiske. **Previous Work in the Practical Handling of Natural Enemies of Injurious Insects**, (pp. 16-46, Fig. 1-9.) (The Importation into the United States of the Parasites of the Gipsy Moth and the Brown-tail Moth). — *U. S. Department of Agric., Bureau of Entomology - Bulletin* No. 91, pp. 312, pls. XXVIII, Figs. 74. Washington, 1911.

The writers first describe all the attempts that have been made to introduce parasites of injurious insects. The only really successful case is that of *Novius cardinatis* — an Australian ladybird — attacking the Cottony Cushion Scale (*Icerya Purchasi*), (1) the parasite has stamped out attacks of the scale in California, Portugal, Cape Colony and Italy. The success of this ladybird is attributed to the facts that it has no parasites itself and that its prey is fixed to the plant.

United States

Attempts to introduce enemies of the Hessian Fly (*Mayetiola destructor*) into the United States, Koebeles work with pests in Hawaii, and Compere's introduction of Fruit-fly (*Ceratitis capitata*) parasites from Brazil and other countries into Western Australia have not yet given any certain results.

« In 1907 Mr. Howard described the first species of a hymenopterous parasite ever recorded as having been reared from a tick. The name given to it was *Ixodiphagus texanus*, and it has been reared from the nymphs of *Haemaphysalis leporis-palustris* Pack., collected on a cotton-tail rabbit in Jackson County, Tex., by Mr. J. D. Mitchell. In 1908 he described another, *Hunterellus Hookeri*, reared by Mr. W. A. Hooker at Dallas, Tex., from *Rhipicephalus texanus* Banks taken from a Mexican dog at Corpus Christi, Tex., by Mr. H. P. Wood. Inasmuch as a closely allied if not identical tick, *Rhipicephalus sanguineus* Latr., is supposed to be a transmitter of a trypanosome disease in South Africa, sendings of the *Hunterellus* were made in the autumn of 1908 to Prof. Lounsbury at the Cape of Good Hope and to Mr. C. W. Howard, entomologist to the government of Lourenço Marques, Portuguese East Africa. In June, 1909, Mr. C. W. Howard reared parasites from engorged nymphs of *Rhipicephalus sanguineus* taken from dogs, with which transmission experiments with trypanosomiasis were being made. Examination showed them to be *Hunterellus Hookeri*. Mr. C. W. Howard is of the opinion that these 1909 reared specimens could not have been of offspring of those sent over in the autumn of 1908, since, as he writes under date of Septem-

(1 See: Abstr, 1957 *Bull.* June 1911.

ber 3, 1909, the latter arrived while he was absent in the Zambesi country, and as he was gone nearly three months, they remained on his desk unopened. When he returned they were all dead. He kept the ticks some time, however, in a sealed jar to see if any more parasites might emerge, but none did so. In his opinion there is absolutely no possibility that the 1909 specimens are the descendants of those sent from Texas. Of course Mr. C. W. Howard is probably correct in his surmise, but a most interesting question arises as to the original home of the parasite. Could it have been carried accidentally from Texas to Africa at an earlier date? As a matter of fact; during the Boer War, thousands of horses and mules were shipped from southern Texas to Cape Town, and much of this stock came from the very region in which the Texas *Rhipiccphalus* occurs. Banks, in his revision of the ticks (*U. S. Department of Agriculture, Bureau of Entomology, Technical Series*, No. 15, p. 35, 1908), records this species from horses as well as from dogs, the horse record coming from New Mexico. The suggestion regarding the importation of horses and mules from Texas to Cape Town during the Boer War was made to the writer by Mr. W. D. Hunter, who also suggests that as *Rhipicephalus sanguineus* occurs thoughout Africa and Mediterranean Europe, and that as in 1853 several shipments of camels were brought to Texas from Tunis, being turned loose at Indianola and roaming wild throughout the territory around Corpus Christi for some years, it is possible that the *Rhipicephalus* was brought to Texas on these camels, and the parasite as well. This seems unlikely, however, since the parasite had never been found in Africa or Europe until the specimens referred to were reared by Mr. C. W. Howard in 1909 ».

L. O. Howard and W. F, Fiske. **The Importation into the United States of the Parasites of the Gipsy Moth** ***(Porthetria dispar)*** **and the Brown-tail Moth.** ***(Euproctis chrysorrhoea)*** — *U. S. Dept. of Agric., Bureau of Entmology. Bulletin* No. 91 : pp. 312, pls. XXVIII, figs. 74. Washington, 1911. 3025

Summary and Conclusions. — "The work of introducing into America the parasites and other natural enemies of the gispy moth and the brown-tail moth has been more arduous than was anticipated when it was begun. It was soon fonnd that the published information concerning these enemies was deficient and unreliable, and that much original research was necessary in order that they might be intelligently handled. Later it developed that the rate of

dispersion of the introduced species was so very rapid as to necessitate larger and stronger colonies than had been contemplated.

"The policy originally adopted of employing foreign entomologists to collect the eggs, caterpillars and pupae of these pests abroad for shipment to the Massachusetts laboratory, where the parasites which they contained might be reared, has resulted in the successful importation and colonization of a considerable number of the parasites which a study of this material, after its receipt at the laboratory, has indicated as being of importance. Numerous others successfully imported have been colonized, but so recently as to render the success of the experiment uncertain. On account of the rapidity of dispersion, which results in the parasites being very rare over a large territory instead of being common over a restricted territory, as long a period as four years may elapse before it is possibile to recover them after colonization. The proportion of such is very small, it is true, but at the same time it may easily be that ultimate success or failure may depend upon the establishment, not of the most important among the parasites and other natural enemies, but of a group or sequeuce of species which will work together harmoniously toward the common end. Viewed in this light, the importaoce of parasites which otherwise might be considered as of minor interest is greatly enhanced.

"It is impracticable to determine certain facts in the life and habits of those parasites which have been colonized under conditions believed, but not known to be satisfactory. Further detailed knowledge is necessary before we can judge whether the circumstances surrounding colonization were in truth the best that could be devised. Furthermore, so long as original research is confined to the study of material collected by foreign agents, some of whom are technically untrained, it is practically impossible to secure the evidence necessary to refute published statements concerning the importance of certain parasites abroad which the results of first-hand investigations have not served to confirm. It is believed that these statements are largely based upon false premises, but should this belief prove ungrounded it would mean that there are important parasites abroad of which little or nothing is known first-hand.

"A determined effort was made in 1910 to better the deficiencies in the foreign service without going to the length of adopting a radically changed policy, but the results were not satisfactory. Lack of assurance that a continuation of the work in 1911 along similar lines would bring more favorable results made its continuation inadvisable. It therefore became a question of adopting new

and radically different methods in so far as the foreign service was concerned.

"In favor of a policy of inactivity was the prospect of an immediate reduction, as opposed to an increase in expenditure should renewed activity be decided upon. There was the chance that the parasites already introduced and colonized would be sufficient to meet the demands of the situation.

"On the other hand, the vast majority of defoliating native insects, which rarely or never become so abundant as to be considered injurious, prove upon investigation to support a parasitic fauna similar in all its essential characteristics to that supported by the gipsy moth in countries where it is similarly a pest at very rare intervals or not at all.

"Parasitism appears to be unique among the many factors of control, in that no other agency similarly increases in efficiency in direct proportion as the efficiency of other agencies, such as climatic conditions, miscellaneous predators, etc., diminishes. In short, the apparent importance of parasitism as a factor in the natural control of defoliating insects has been decidedly enhanced as a result of these more or less technical and intensive studies. It can be said with the utmost assurance that if a sufficient number and variety of parasite and other natural enemies of the gipsy moth which act in a manner comparable to the true facultative parasites, as above described, can be introduced into America, the automatic control of the gipsy moth will be permanently affected.

"During the past four years the "wilt" disease has been increasing somewhat in efficiency, but notwithstanding that it is and has been prevalent in every locality in which the gipsy moth has been allowed to increase unchecked, the gipsy moth still continues to be a menace to the life and health of valuable trees which have been protected during this time at a considerable cost. In parts of Russia, where parasitic control is obviously inefficient, control through disease is not sufficient to keep the gipsy moth from increasing until defoliation of large areas results. Similarly, in America, the destruction of very large numbers of caterpillars of several sorts of the larger Lepidoptera has been observed, but in no instance until after the caterpillars involved had increased to such numbers as to become a pest.

"It may be that the parasites already introduced and established, or likely to become established, will prove to be sufficient for the purposes intended. Only events themselves can be depended upon to answer this question, and from five to six years must pass before the answer is known. During this period the gipsy moth

will continue to disperse and multiply, and large expenditures will be necessary to prevent much more rapid dispersion and multiplication than has prevailed in the past.

" Expenditures amounting to a very small percentage of the total will suffice to carry on the parasite work. If the parasites already introduced are sufficient to meet the needs of the situation, the expenditure projected will have been needless and unnecessary. If the parasites already introduced are not sufficient, it may be that this deficiency can be made up in time to avoid much if any delay in the day of final triumph ".

THE PRESENT STATUS OF THE INTRODUCED PARASITES. — Under this heading a summary is given of the colonizations effected and their result. " The gross number of each of the various species which have been colonized since the beginning of the work up to and including the season of 1910 is given in the accompanying tabulated statement:

Hymenopterous Parasites.

Schedius Kuvanae How	1 061 111
Pteromalus egregius Först	354 300
Anastatus bifasciatus Fonsc	177 210
Trichogramma spp.	76 000
Apanteles fulvipes Hal.	57 700
Apanteles lacteicolor Vier.	44 310
Monodontomerus aereus Walk.	15 325
Telenomus Phalaenarum Nees	4 650
Meteorus versicolor Wesm.	3 113
Pimpla spp.	583
Chalcis spp.	338
	1 794 640

Tachinid Parasites.

Carcelia gnava Meig.	15 581
Tricholiga grandis Zett	8 721
Zygobothria gilva Hartig.	7 502
Compsilura concinnata Meig.	6 777
Dexodes nigripes Fall.	5 040
Blepharipa scutellata R. D.	5 109
Parexorista Cheloniae Rond.	5 026
Tachina larvarum L	2 036
Parasetigena segregata Rond.	1 187
Crossocosmia sericariae Corn.	699
Pales pavida Meig.	476
Tachina japonica Towns.	471
Zenillia libatrix Panz.	161
Zygobothria nidicola Towns.	109
Masicera silvatica Fal.	23
Eudoromyia magnicornis Zett.	5
Unclassified Tachinids (1906-07)	9 420
	68 343

Predatory Beetles.

Calosoma sycophanta L.	17 742
Carabus auratus L.	478
Calosoma inquisitor L.	262
Carabus arvensis Hbst.	108
Carabus nemoralis Müll.	100
Calosoma reticulatum Fab	83
Carabus violaceus L.	62
	18 835
Total . . .	1 881 818

THE DEVELOPMENT OF THE YEAR 1910: — " At the beginning of the year 1910 the statement was made that if the parasites maintained the rate of progress which was then indicated by the results of the recent field work, the year 1916 would see the triumphant conclusion of the experiment and the automatic control of the gipsy moth through parasitism. This prophecy was also dependent upon the measurable success of the importation work which was planned for 1910. »

But the importations of 1910 were disappointing. The progress of the parasites in the field was also not as satisfactory as had been expected, though two cases occurred of the recovery of parasites supposed to have been lost before.

" It is by no means easy to draw a balance which should fairly represent the status of the work as a whole in 1910 as compared with 1909, but after long consideration it was definitely decided that the present status of the parasites was perhaps less favorable to ultimate success than the apparent status of the work one year before. Recognition of this fact had much to do with the formulation of the policy for the continuation of work in 1911. It is hoped that by putting forth an especial effort the small amount of lost ground may be regained, and that by 1912 it will be possible to state with assurance that the progress hoped for at the close of 1909 has been more than equalled, and that the chances are still favourable to the successful outcome of the work and to the establishment of an efficient and automatic control of the gipsy moth by the year 1916 ".

3026 G. Del Guercio. **On some Enemies of the Olive Tree Scolytus. *(Phloeothrips oleae)*** (1). Preliminary Notes. (Intorno ad alcune cause nemiche del Fleotripide dell'Olivo. Note preliminari). — *Redia, Giornale d'Entomologia pubblicato dalla R. Stazione di Entomologia agraria in Firenze,* Vol. VII, fasc. I, pp. 65-70, 2 figg. Firenze, 1911.

Italy: Liguria

In the course of his investigations of the life history of the Scolytus of the Olive tree, begun last year in Liguria, the author observed that the grubs and nymphs of the insect are a prey to various destructive causes of a biological character, hitherto unknown to science.

Microscopical examination revealed to him in the somatic cavity of the Scolytus grub, the presence of the larvae of a Chalcidid, which the Author intends to describe with fuller details as soon as he has obtained a sufficient number of perfect forms of this parasite. The latter, in feeding, destroys all the viscera of the victim, leaving finally only the outer shell. As the Scolytus, under the parasitic action of the Chalcidid, prematurely assumes a saffron or orange hue peculiar to the nymphs of that insect, the parasite and the fact of its presence in Scolytus infections have hitherto completely escaped detection.

A second endogenous destructive cause, resulting in the death of the Scolytus, consists of very small spherical bacteria with a lighter nucleus, of which future cultures will indicate the generic and specific character.

A third cause of destruction acting from without against the Scolytus, is the existence of various insects which prey upon it and thus impede its development.

Subsequent observations will enable it to be ascertained whether it is these destructive causes alone or more particularly physical agents (atmospheric perturbations) which last year in Liguria resulted in a reduction of the damage and the disappearance of the Scolytus, observed in certain olive groves previously greatly injured by the insect.

One thing remains certain; it results from observations carried out at the end of October, that the Chalcidid mentioned above succeeded in destroying up to about 90 % of the Scolytus.

(1) Cf. Abst. 350 *Bull.* Janv. 1911; Abst. 1594 *Bull.* May 1911. (*Ed.*).

GIACOMO DEL GUERCIO. ***Tetrastichus Gentilei* Del Guerc. in its Relations to the Scolytus of the Olive tree.** Preliminary Notes. (Il *Tetrastichus Gentilei* Del Guercio nei suoi rapporti col Fleotripide dell'Olivo. Note preliminari). — *Atti della Reale Accademia economico-agraria dei Georgofili di Firenze*, serie 5ª, vol. VIII, disp. 3ª-4ª, pp. 123-222. Firenze, 2 settembre, 1911. 3027

The author was the first to observe that the larvae of the Olive tree Scolytus were mined inside by the larvae of quite a small parasitic Hymenopter, which is said to be the only endophagous enemy of the Scolytus hitherto known, and which the Author provisionally classed as akin to the geuus *Eulophus* Geoffr. He now places it in the genus *Tetrastichus* Halid., under the name of *T. Gentilei* Del Guerc. Italy: Liguria

After having given a systematic description of the insect and indicated its life history, the author enquires how its spread can be facilitated and what effects might be expected.

A simple examiuation of the Scolytus larvae, with the magnifying glass and the naked eye, furnishes proof that they are infected; as soon as this is ascertained they should be collected and conveyed to the parts most seriously affected by the invasion of the Scolytus. The infected branch may also be cut off, cleared of adult Scolyti and put, with the *Tetrastichus*, in the places where infection foci are to be formed. This operation must be carried out during the winter. To clear the branch of adult Scolytus, it need only be plunged for a very brief space of time in ½ % nicotine water, and gently stirred therein. Afterwards to prevent the action of the poison reaching the grubs of the *Tetrastichus*, enclosed in their victim, the branch must be washed for some minutes with pure water. After having cut off the branch in winter, it can also be exposed to the sun to bring out the Scolytus, portions of the branch being afterwards distributed over the infected plants, selecting those already pruned, for the destruction of the Scolytus.

The Author ascertained, it is true, that *Tetrastichus* is very effective against Scolytus, but nevertheless does not believe himself justified yet in stating that this activity will perforce be produced everywhere and in all cases. Indeed he has already observed that while this parasite is very rare in the province of Lucca, it is very wide spread in Liguria. It is not yet known exactly whether the *Tetrastichus* belong like the Scolytus to the indigenous fauna of the Mediterranean.

The Author recommends suitable pruning of the Olive trees in Liguria; this will reduce the nnmber of Scolyti and at the same

time promote the spread of *Tetrastichus* which is impeded in a very great degree by spiders. Where it is possible to use insecticides the Author advises sparing the larvae of Scolytus, in order not to endanger the action of *Tetrastichus*.

3028 United States — **Parasites of *Phytonomus nigrirostris*.** — See above, No. 3015.

3029 Mexico. United States — ***Pediculoides ventricosus* Parasite of *Paraxonotha Kirschi* the Mexican Grain Beetle.** — See below, Abstr. 3039.

3030 Barbados — ***Zalophotrix mirum*, Hymenopterous parasite of *Saissetia nigra*.** — See above, Abstr. 3015.

3031 Egypt — **Parasites of the Cotton Boll-worm *(Earias insulana)* in Egypt.** — See below, Abstr. 3040.

3032 Austria: Bohemia — **Parasite of *Hydroecia micacea* injurious to Hops.** — See below, Abstr. 3050.

3033 Italy — **Parasites of Insects injurious to Olive Trees.** — See below, Abstr. 3063.

3034 — L. W. Mc Atee. **Our Grosbeaks and their Value to Agriculture** — *U. S. Deptm. Agr. Farmers'* Bull. 456, pp. 14. Washington, June 30, 1911.

United States — Like many other native species, the grosbeaks inflict some damage to crops, but the good they do by the destruction of noxious insects far outbalances the harm. It is the purpose of the bulletin under review to make known the exact nature of the services rendered by grosbeaks, to suggest means of reducing or preventing such damage as they do, and to propose methods of protecting them.

The " rose-breasted grosbeak "; " Potato bug bird " (*Habia ludoviciana*), breeds from Kansas and the mountains of Tennessee north to Newfoundland and the Great Slave Lake region. No less than $^1/_{10}$ of the total food of this bird consists of both larvae and adults (*Lepinotarsa decemlineata*). Among other pests consumed by the rose-breasted grosbeak are: cucumber beetles (*Crepidodera cucume-*

ris), the Rocky Mountain locust (*Caloptenus spretus*), the spring and fall cankerworms (*Anysopterix vernata* and *A. pometaria*), orchard and forest tent caterprillars (*Clisiocampa americana* and *C. sylvatica*), tussock moth (*Orgya leucostigma*), gipsy moth (*Euproctis chrysorrhoea*), brown tail moth (*Portheria dispar*) plum curculio (*Conotrachelus nemphar*), army worm and chinch bug (*Blyssus leucopterus*).

The "cardinal" or "redbird" (*Cardinalis cardinalis*) ranges from Southern Mexico. Lower California and Arizona, north to Iowa and Ontario, and east to the Atlantic coast. The redbird is known to feed on the Rocky Mountain locust, periodical cicada (*Cicada septemdecim*) and Colorado potato beetle. It is a great enemy also of the rose chafer (*Macrodactylus subspinosus*), cotton worm (*Alabama argillacea*), plum or cherry scale, and other scale insects, and attacks many other important insect pests, including the zebra caterpillar of the cabbage (*Mamestra brassicae*), the cucumber beetles, billbugs (*Sphenophorus* spp.), locust flea beetle, corn ear worm, cotton cutworm, southern fig-eater (*Allorhina nitida*), codling moth (*Carpocapsa pomonella*), and boll weevil (*Anthonomus grandis*).

The "blackheaded grosbeak" or "western grosbeak" (*Habia melanocephala*) ranges from southern Mexico to British Columbia, North Dakota and Nebraska. It is a foe to the worst pests of horticulture, the scale insects (Coccidae), which compose $^1/_4$ of its food. The black olive scale (*Saissetia oleae*) alone constitutes $^1/_5$ of the bird's subsistence, and the frosted scale and apricot scale, or European fruit Lecanium (*Lecanium persicae*) are also destroyed. In May a considerable number of cankerworms (*Amysopterix*) and codling moths are eaten, and almost $^1/_6$ of the bird's seasonal food consists of flower beetles (*Meligethes*), which do incalculable damage to cultivated flowers and to ripe fruit.

The "blue grosbeak" or "blue pop" (*Guiraca coerulea*) breeds over the southern two-thirds of the United States. In certain localities after the breeding season, blue grosbeaks collect in flocks, move into grainfields, particularly those of oats and rice, and sometimes do considerable harm. Despite such depredations, the loss of cereals is repaid manifold, since the birds consume almost 5 times as much insect food as grain. They devour weevils, grasshoppers, purslane caterpillars and cotton cutworms, enemies of sugar beets and cotton.

The "gray grosbeak" or "parrotbill" enters the United States only in Texas, Arizona, and New Mexico. It is more fond of caterpillars and grasshoppers than of other insects. Weevils are next in order of preference. The parrotbill ranges over much of the cotton belt of Texas and feeds upon two important cotton pests: the

boll weevil and the cotton worm (*Heliothis obsoletus*). In August and September $^{7}/_{10}$ of the gray gros beak's food is weed seed, $^{5}/_{10}$ consisting exclusively of the seeds of two of the most important weeds of the south, namely foxtail (*Setaria* spp.) and bur grass (*Lappula*).

The rose breasted and the blackhead grosbeak and the cardinal are charged with pulling more or less seed grain. This fault, however, is not very serious, since it is well-known that repellant mixtures applied to grain before sowing protect it completely. Standing grain may be insured against the attacks of small birds by planting a few rows of millet on the edges of the field. Only the black headed grosbeak does noteworthy damage to fruit. Where the trees are few, the use of bird netting is recommended. In large orchards the best plan is to plant amoug the fruit trees or on the edges of the orchards a number of wild fruit trees as decoys. The best for the purpose are elder (*Sambucus* spp.) (especially in the West), mulberry (*Morus rubra*), Juneberry (*Amelanchier canadensis*) and wild or seedling cherries. For the purpose of attracting birds it is important to plant wild fruit such as: the above mentioned, dogwoods (*Cornus* spp.) hollies (Ilex spp.) juniper, bayberry (*Myrica carolinensis*), Virginia creeper (*Parthenocissus quinquefolia*), blueberries (*Vaccinium* spp.), blackberries (*Rubus fruticosus*), and wild grapes.

3035 **Insectivorous Birds of New South Wales** (1). — *Agricultural Gazette of New South Wales*, Vol. XXIII, Part 6, pp. 503-504. Sydney, June 2, 1911.

"Sacred Kingfisher" (*Alcyon sanctus* Vig. and Hors).

Australia: N. S. Wales

In the hot districts of New South Wales or in colder regions with exceptionally warm winters, but few birds are found which remain throughout the year; generally they migrate towards the North when the winter comes.

They go to New Guinea, the New Hebrides, Java and the other big islands north of Australia. The "Sacred Kingfisher" feeds on lizards, small snakes, coleoptera, grasshoppers and other insects.

"Crested Bell Bird". There are two birds called "Bell Birds" in New South Wales. One; the "Minah" or Garrlous Honey-Eater lives in the mountains on the coast and the forests of the South;

(1) Cf. Abst. 2337 *Bull.* July 1911. (*Ed.*)

it is one of the most dangerous pests of orchards and vineyards, being very fond of fruits. The other, the "Crested Bell Bird" (*Oreoica cristata* Leurin) is a useful bird of the interior of Australia. It constantly assists in extending the limit of cultivation of wheat towards the West by keeping injurious insects in check. Not only do these birds feed on insects, but they also select the dead bodies of caterpillars for lining their nests.

Birds Controlling *Anticarsia gemmatilis*, Injurions to the Velvet Bean. — See above, Abstr. 2558. 3036 United States

Arsenical Insecticides (1). — *Journal d'Agriculture pratique*, Tome II, No. 29, pp. 68-69. Paris, 20 Juillet 1911. 3037

The first treatments for the destruction of Cochylis have for some months past involved the use of considerable quantities of arseniate of lead washes; they do not seem to have caused serious accidents. Nevertheless, Dr Cazeneuve, Senator of the Rhone, thought himself justified in stating in the Academy of Medicine that fatal accidents had recently occurred. In consequence of this communication. the Academy at its sitting of the 12th July adopted a resolution repeating in the following terms the desiderata embodied in its resolutions on this subject the previous year; France

The Academy taking into consideration the fatal accidents cited by Dr. Cazeneuve, thinks it necessary to call the attention of the Government again to the conditions under which it had authorised the use of arsenical preparations in agriculture. and in default of which it assumed no responsibility.

Arsenical salts intended to be used for agricultural purposes — from which salts those containing lead must be strictly excluded — shall henceforward only be supplied upon the advice of the Professors of Agriculture and by permission of competent authorities.

Their natural colour and odour shall be altered.

They shall always be kept in a safe place under lock and key.

They shall only be supplied under their real name and never under a fancy name.

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(1) Cf. also Abst. 346 *Bull.* Jan. 1911; Absts. 661-662, 666, 669 *Bull.* Feb. 1911; Abst. 1048 *Bull.* March 1911; Abst. 1573 1575 *Bull.* May 1911; Abst. 2339 *Bull.* July 1911. (*Ed.*).

Their use shall continue to be unlawful in all market gardening operations.

They shall cease to be used from the time the fruits begin to appear.

They shall never be employed except according to the instructions, under the direction, and effective surveillance, of the Professors of Agriculture.

In a letter to the Prefect of the Rhône, M. Chatillon, President of the Union Beaujolaise, reminds the Prefect that since the spring the Syndicates of this Union have supplied more than 40 000 kilogrammes of arsenical insecticides which have been used without any accident being heard of.

3038 G. LAFFORGUE. **Sulphide of Carbon and Cochylis.** — *Le Progrès agricole et viticole*, 32e année, No. 30, pp. 104-105. Montpellier, 23 Juillet 1911,

During the last wine-growing season, in the Gironde and Italy, a product containing sulphide of carbon was tested against Cochylis and Eudemis. Many enquirers had already conceived the idea of using this product as the base of their insecticides. For various reasons, chiefly irregularity in the results, its use did not become general. This check, in Mr. Lafforgue's view, is mainly due to want of sufficient attention to the evolution of the insect to be destroyed. Applied too late, when the parasite had already done much damage and was sheltered in its cocoon, the treatment lost greatly in its efficacy; this in no way detracted however from its true value.

France: Gironde. Italy.

Therefore, in view of the comparative failures of arseniate of lead under many conditions, and the difficulty of obtaining nicotine, the writer thought fit to return to this question. Many vine growers have used against the first generation either the Catoni formula (0.500 kg. (1.1 lb.) of sulphide of carbon, 2 kg. (4.4 lb.) of ordinary or resin soap, 100 litres (22 gals) of water ; or the Saintout product (with sulphide of carbon, soap and carbonate of soda: 2 litres (0.22 gals) of insecticide per 100 litres (22 gals) of copper mixture) supplied ready for use by the inventor, and, according to the enquiries made by Mr. Lafforgue, there are very few people who are not satisfied with it. In the experiments he carried out personally, in spite of the bad conditions of the test (one treatment was made too late, on the 8th June) he obtained highly encouraging results, the destruction being the same as

with nicotine used at the same time. It is indispensable however to apply the treatment early, at the time the eggs are laid. In comparatively cold or wet weather, two applications, at 8 or 10 days interval would be advisable. If the temperature is normal and the weather hot, a single application may suffice. It will also be necessary to wet the bunches of grapes, and make them the special objective in applying the remedy properly. This may be done by suitable stripping off of the leaves and closer surveillance of the workmen; also by the use of jet nozzles which can be shut off, leaving the operator a free hand either momentarily or for any length of time.

Insects and Other Injurious Invertebrates. Their Biology and Control.

F. H. CHITTENDEN. **The Mexican Grain Beetle (*Pharaxonotha Kirschi* Reitt.).** — *U. S. Deptm. of Agr., Bur. of Ent.*, Bull. No. 96, Part I, pp. 18 (8-13). Washington, March 25, 1911. **3039**

Among the grain insects not yet permanently introduced into the United States, but frequently observed there, is a clavicorn Coleopteron, *Paraxonotha Kirschi* Reitt. In the present article the description and biology of this species is given. The writer observed only one natural enemy of the beetle, a preying Acarid, *Pediculoides ventricosus* New. **Mexico: United States**

Granary Insects. — See above Abstr. 2531. **3040 Italy**

3041 E. O. G. KELLY. **The Maize Billbug (*Sphenophorus Maydis* Chitt.)** — *U. S. Deptm. of Agr., Bur. of Ent., Papers on Cereal and Forage Insects*, Bull. 95, Part II, pp. 22. Washington, April 22, 1911.

Several species of the genus *Sphenophorus* have been pointed out as enemies of young maize at the beginning of spring. Dr. S. A. Forbes (*Twenty-third Report of the State Entomologist of Illinois*, 1905), mentions eight species of this genus, the adults of which attack young maize. Since 1905 complaints have been made every year in places in Kansas, South Carolina, Georgia and Alabama, owing to the damage caused to the maize by *Sphenophorus Maydis* Chitt. This species has been confused with *S. pertinax* Oliv. and *S. robustus* Horn.

United States: Kansas S. Carolina Georgia Alabama

Nevertheless, it is quite distinct from both of them, and was only recently described as a special species.

The adults and larvae attack young maize; the adults, the larvae and probably the nymphs also attack "Swamp Grass" (*Tripsacum dactyloides*).

The eggs are deposited in the stalks.

The freshly hatched larvae begin to eat the tissues of the young maize at the bottom of the pierced hole where the eggs were deposited, directing their furrow inwards towards the lower part of the tap-root.

The insects begin to attack the maize when it is about 4 to 5 inches high; inserting their rostrum into the young stalks just above the ground, they make their way to the centre and destroy it. The stalks thus visited by the insects yield no grain.

There is only one generation per year. The eggs are laid in June, the larvae appear between June and September, the nymphs from the beginning of August to the end of September, and the adults from the middle of August to the beginning of August in the following year.

As the insects remain in the tap-root of the plant till spring, a good remedy against these pests consists in pulling up and burning the stubble. This is also the most practical means of destroying the "Lesser Corn Stalk Borer" (*Diatraea saccharalis*).

3042 ***Anticarsia gemmatilis* Injurions to the Velvet Bean *(Stizolobium deeringianum)*.** — See above, Abstr. 2558.

United States

***Diatraea saccharalis* Parasite of *Reana luxurians*.** — See above; Abstr. 2567. 3043 Argentina

The Mustard Beetle *(Phaedon Betulae)*. — *The Journal of the Board of Agriculture*, Vol. XVIII, No. 5, pp. 413-414, London, August, 1911. 3044

The Board of Agriculture and Fisheries of Great Britain has been informed that *Phaedon Betulae* has been causing a great deal of damage this season in some districts. Great Britain

The insects winter under various shelters, such as mustard stubble, the hollow stalks of other plants, in the vicinity of food plants and in crevices of every kind. They lay in spring and summer, and growing plants are attacked by the worms and adults at the same time. The worms pass into the nymph stage in the soil. *Phaedon Betulae* can be destroyed ;

a) By means of a piece of tarred sackcloth drawn along and over the plants ;

b) By spraying the crops attacked with arseniate of lead, which can be obtained ready for use in the form of paste, in the proportion of 1 lb. in 25 gallons of water. It has been observed that sometimes at a more advanced period of the year, the insects emigrate in large numbers into other fields. In this case a shallow trench must be dug along the path of the swarm. If care be taken to tar the trench well, many insects will be caught, although they have wings. After an invasion the stubble must be burnt before ploughing, in order to destroy the hibernating insects.

F. Picard. **Beetroot Insects** (1). — *Le Progrès agricole et viticole*. 27e année, No. 32, pp. 157-162, 1 pl. en chromo. Montpellier, 6 Août 1911. 3045

The writer describes the most important beetroot insects, their habits, the damage they cause and means for combating them. Here is a list of the insects ; *Silpha opaca* L., *Atomaria linearis* Steph., *Cleonus mendicus* Gyll., *C. punctiventris* Germ., *C. sulcirostris* L., *Cassida oblonga* Illig., *C. nebulosa* L., *Agrotis segetum* Schiff.). The silver Y Moth, *Plusia gamma* L., *Mamestra Persicariae* L., *Lita ocellatella* Boyd. France

(1) Cf. p. 176 *Bull.* Nov. 1910; p. 379 *Bull.* Dec. 1910; Abst. 677 *Bull.* Febr. 1911 ; Abst. 1055-1056 *Bull.* March 1911 ; Abst. 2354 *Bull.*, July 1911. (*Ed.*).

3046 ***Aphis Fabae*, a Beetroot Pest in the Duchy of Brunswick.** (Die Verseuchung der Rübenfelder). — *Zeitschrift der Landwirtschaftskammer für das Herzogtum Braunschweig*, 80 Jahrg., No. 16, pp. 220-202. Braunschweig, 21 Juli 1911.

Germany: Brunswick

Aphis Fabae, known under the name of "black fly" is generally only found on beans, rumex and poppies; nevertheless, in the spring of 1911, it was found on the sugar beet in the Duchy of Brunswick.

As the plant lice frequently appear on the young seedlings they are supposed to have been born from eggs laid on the seed.

No remedy applicable to farming on a large scale is known.

3047 **Control of *Heliothis Obsoleta*, Injurions to Cotton in Uganda.** — See above, Abstr. 2584.

3048 G. C. Dudgeon. **Methods Employed in Egypt and Elsewhere to Check the Ravages of the Cotton Boll-worm *(Earias insulana).*** — *The Agricultural Journal of Egypt*, Vol. I, Pt. I, pp. 40-43, Cairo, 1911.

Egypt

Among the many insect enemies which the cotton plant has to contend with in different parts of the world, none are so destructive in their effect as those which penetrate the flower buds and fruiting capsules, and which beneath the covering thus afforded, devour the tissues which, normally, would have produced cotton. The ravages of these insects, especially in their early stages, are less conspicuous than those of the leaf and stem feeders, and, owing to their cryptic methods of feeding, they are insured protection against predaceous birds and insects, and enabled to multiply rapidly until they often infest every bud or boll on a plant.

Many species of bud and boll-infesting insects occur, but only the one prevalent in Egypt is referred to here. It is generally known as the Egyptian Cotton Boll-Worm, "Ver de la Capsule" or "Dud el Loz". The distribution of this pest is, however, not confined to Egypt, the range of the species extending into East, Central and South Africa, Madagascar, Mauritius, Northern Nigeria (Bornu), India, Burma, Siam and Queensland. The zoological position of the insect is in the order *Lepidoptera*, family *Noctuidae*, subfamily, *Acontianae*, the genus being an aberrant one of the sub-family exhibiting an incomplete neuration of the hind-wings.

The period during which the greatest facilities are offered for the destruction of these insects is in winter, when their numbers are reduced to the few which congregate on the cotton, bamieh, (1) and tîl (2) plants which have been permitted to remain on the ground. If these were destroyed, the pest would practically be eradicated for the next season.

A proposal has been made by the Egyptian Department of Agriculture to the Ministry of the Interior for control of the pest at the period when it attacks the terminal shoots of the young cotton. The plantation of "trap crops" warrants attention; this system is employed in America and India.

In the latter country, the boll-worm is parasitized by three distinct insects: two Hymenoptera and a Dipteron. One of the former, *Rhogas Lefroyi* Ashm. is bred for distribution in the cotton areas.

Whether similar parasites exist in Egypt is a matter for investigation, but the eradication of the pest's food plants in the winter is obviously a more effective and simple remedy.

Cotton Worms in St. Kitts. ***(Alabama argillaca).*** — *The Agricultural News*, Vol. X, No. 241; p. 236, Barbados, July 22, 1911. 3049

The Superintendent of Agriculture in St. Kitts mentions in a report, that the young sugar cane and cotton plantations of the island have made great progress during June, and that they were in good condition at the end of the month. Leeward Islands: S. Kitts

An insect, *Alabama argillacea*, has appeared in several fields on two plantations, but has been kept in check by the use of Paris green.

Franz Tolg. **A New Hop Pest, *Hydoecia micacea*** (3). — (*Hydroecia micacea* sp., ein neuer Hopfenschädling). — *Herausgegeben vom Landeskulturrat für das Konigreich Bohmen*, mit 2 Tafeln und Original-Figuren, pp. 1-29, Saaz, 1911. 3050

Hydroecia micacea sp., already very wide spread through the Arctic region as far as North America, has made its appearance in Bohemia, where it is causing great damage to the hop plantations. Austria Bohemia

(1) *Hibiscus esculentus.*

(2) *Hibiscus cannabinus.*

(3) Cf. Abst. 1984 *Bull.* June 1911. (*Ed.*).

It stops fructification in the plants attacked and causes losses amounting to 8 and 10 % of the total yield.

The larvae of this insect make their way inside the young shoots, devour the tender tissue and dig long and intricate galleries.

The writer describes the insect in detail from the morphological and biological point of view. To this description he adds a list of the principal natural enemies of *Hydroecia*.

We may mention among these, the larvae of *Lydella* (*Ceromasia*) *lepida* Mg., *Macrocentrus* (*Amicroptus*) *infirmus* Nees, *Diadegma* (*Mcloboris*) *crassicornis* Grav. and *Exephanes occupator* Grav., which live as parasites on the larvae of *Hydroecia*.

In addition, moles destroy a large number of the chrysalides hidden in the soil.

3051 French W. Africa

***Phospharus Jansonii* injurious to *Cola nitida* in French West Africa.** — See above, Abstr. 2637.

3052

KEATING. **Two Lepidopters Attacking the Vanilla Plant in Madagascar**. (Note sur une Chenille s'attaquant aux Vanilliers). — *Colonie de Madagascar et Dépendances, Bulletin économique*, 10e année, 2e semestre, No. 2, pp. 251-252. Tananarive, 1910 (recu le 26 Août 1911).

The Vanilla plantations in the province of Nosy-Be have for a long time been attacked by an insect, which however only caused serious damage during recent years. In July the flowers attacked Madagascar contain a caterpillar or show traces of its passage. The larva is very agile and can attain a length of 10 mm. For its transformation it makes a white cocoon 8 mm. in length; 12 to 15 days after the caterpillar has formed its cocoon the butterfly appears.

This Lepidopter is nocturnal, of the family of the *Tincidae* and of the genus *Hyponomeuta*.

The caterpillar is always found at the end of the pistil on which it lives and undergoes transformation. It only appears on the flower after its fertilisation and when the fruit has begun to form. For the rest, its appearance is not regular, and therefore capsules are observed 10 to 13 cm. in length, the flowers of which have been attacked, whilst others are hardly developed. In the latter case, it is preferable to cut them so that the healthy fruit may benefit.

To explain the stoppage in growth of the capsule when the flower only is touched by the insect, it must be assumed that the caterpillar when feeding diffuses a liquid which must poison the fruit before the flower is detached.

This caterpillar is found in all the plantations of Nosy-Be, as well as in those of Nosy-Faly and Nosy-Komba, where it causes great damage.

There is a second nocturnal Lepidopter of the order of the Bombycidae, the caterpillar of which attacks the flowers of the Vanilla plant. This grub is greyish, 3 cm. long, hairy, vesicant, and lives solitary. It gnaws the flower before its fertilisation.

The perfect insects of these larvae being nocturnal moths, the most practical and cheapest means for combating them is the lantern trap (1).

JAMES HUDSON. **Insect Pests in Glass-Houses.** — *The Gardeners' Chronicle.* No. 3684, p, 88. London, August 5, 1911. **3053**

The " mealy bug " thrives amazingly during the hot weather, and if its destruction is neglected, it will give rise to an endless amount of trouble later. In the stove-house this pest is partial to many plants, but to none more than to Ixoras and Dipladenias. In the case of Ixoras it is generally found amongst the trusses of blooms which, if badly infested, will be partially spoiled. The best remedy is to syringe with clean tepid water, applied not too vigorously **Great Britain**

(1) The animal parasites of the Vanilla plant known in Réunion were studied by M. Edmond Bordage.

They are as follows: " Trioza de l'Avocatier marron " (Hemipter of the family of Psyllidae); " Green wood bug " or " emerald bug " (*Nezara smaragdula* Febr.); " Vanilla Moth " (Microlepidopter); *Plusia aurifera* Hb. (Lepidopter) *Hoplia retusa* Klug. and *Cratopus punctum* Fabr. (Coleopter). A few gasteropod molluscs and in particular the *Helix* and the *Achatina* at times gnaw the liane, especially during very dry years.

The following cryptogamic diseases of the vanilla plant have been described: *Vermicularia Vanilla* Declar.; *Calospora Vanillae* Massee; *Gloeosporium Vanillae* Cooke; *G. affine* Sacc.; *Uredo scabies* Cooke; *Laestadia Traversi* Cav. (H. LECOMTE and M. Q. CHALOT, *Le Vanillier,* pp. 64-76. Paris, Naud, 1902).

In 1909 vanilla was exported from Madagascar to the value of 1,202,657 fr. (£48,106). (*The Stateman's Year-book 1911,* p. 804). (*Ed.*).

(2) *Coccus adonitum.* Cf. R. HOOPER PEARSON, *The Book of Garden Pests,* p. 31, London-New York, 1911.

Mealy bug also infests the flower-trusses of Dipladenias; in this case, a weak solution of methylated spirits applied by means of a soft camel-hair brush will be found effectual in destroying the insect. By a judicious use of the syringe in places where insects are suspected of lurking, the mealy bug, thrips, and red spider (1) may all be kept in check. The chief trouble with insect pests in greenhouses and stoves is usually experienced with climbing plants that are trained to the roof or upright columms. No insect, perhaps, is more troublesome in its attacks upon plants of the stove section of *Dracaena* than red spider, which may often be found in colonies even before its presence is suspected, In this case, frequent syringings with soot water will be found effectual, except in extreme cases, when sponging with an insecticide must be resorted to, Much may be done to keep insects in check by fumigation or vaporising with a nicotine preparation.

3054 FREDK C. ADAMS. ***Hippeastrum* Bulbs Destroyed by Grubs *(Merodon equestris).*** — *The Gardeners' Chronicle*, No. 1280, vol. L, p. 7. London, July 8, 1911.

Great Britain

It has been found that grubs of the "Narcissus Fly" (*Merodon equestris*) obtain a lodgment in *Hippeastrum bulbs*. These grubs completely destroy the plants.

3055 P. NOEL. **The Rose Laurel and Jasmine Louse *(Aspidiotus Nerii).*** — *Bulletin mensuel de la Société centrale d'Agricolture, d'Horticulture et d'Acclimatisation*, LI année, No. 8, pp. 260-261. Nice, 2 Août 1911.

The *Aspidiotus Nerii* is a Hemipter, very injurious to the jasmines of Algeria and also to the rose laurels (*Nerium Oleander*). This member of the Coccidae adheres in families to the lower surface of the leaves, along the veins.

Algeria

They can be got rid of by submersion. Unfortunately this method is hardly practicable for cultivation on a large scale. Two other methods are suggested.

1. If the jasmines and laurels attacked stand in a plant house or in enclosed buildings, tobacco smoke is very rapid and sure in its effect, care being taken the first year to have at least

(1) See Abstr. 1998, *Bull.* June, 1991.

three fumigations with tobacco waste or better still with manufactured juice of 12 degrees Baumé, which it is only necessary to spray on to a very hot cast iron plate. The first fumigation must be done in the spring before the hatching of *Aspidiotus Nerii*; then again towards the month of May and finally in July. By this operation, plantations will rapidly be freed from this formidable insect.

2. If the jasmines and laurels are in the open air, a petroleum emulsion must be sprayed on them at the same times as for the tobacco fumigations. The following emulsion may be successfully used; water 10 litres (2.2 gals.); petroleum 500 grammes (1.1 lb.); black soap 150 grammes (5 oz.).

First dissolve the black soap in 10 litres of water, then put the petroleum in a pail, pour into it the soap water, a little at a time, thoroughly stirring the petroleum the while with a stick. It is preferable to spray the liquid on the shrubs attacked, in the evening so as to avoid over-rapid evaporation.

HENRI BLIN. **The Anthemis Disease.** — *Revue horticole*, 83e année, No. 16, pp. 382-383. Paris, 16 Août 1911. **3056**

Flower growers who produce the Anthemis as an article of trade, particularly in the district of Lyons and Provence, have complained for some years of a disease which has attained considerable development in their cultivations and caused extensive losses. The Anthemis flower is the staple of an important trade, and some producers have suffered the complete loss of whole beds of this flower. **France**

Already in 1908-1909, the region of Lavandou (Var). famous for its Anthemis growing, was devastated by the disease, which chiefly attacks the *Anthemis frutescens*. This disease is now specially rife in the district of Lyons and Provence, where entire beds devoted to the culture of Anthemis have been destroyed. The leaves first turn yellow and then black; this blackening passes on to the stalks; finally the plant withers and dies. The roots show excrescences varying in size from a pea to a big plum. These nodosities are numerous on the Anthemis " Reve d'Or ", the collar of which is often hypertrophied with them. The white Anthemis is less liable; these swellings are observed on the ramifications of the root; the variety " A. Coronation " has very few of them. In these nodosities there are found Anguillulae and the eggs of *Heterodera radicicola*. The investigations of Messrs Jumelle and Raybaud, Treub, Soltwedel and others, tend to show that the Anguillula is

not the only cause of the disease, but that the latter might have, as the agent of its propagation, a bacterium, as to the nature of which there is no precise knowledge as yet, The leaves and stalks of dead or dying plants are covered with *Alternaria tenuis;* and the stalks and roots of the diseased plants are invaded by the mycelium of a Chytridina (*Pysoderma* or *Cladochytrium*). But certain inferences cannot be drawn as regards the part played by these fungi.

War must chiefly be waged against the animal parasite. Carbon sulphide in the proportion of 500 grammes (1), sulpho-carbonate of potassium in a dose of 50 to 60 grammes per square metre, and solutions of permanganate of potash of 1 % strength are very effective against the Nematodes. Iu cultures where the inroads are extensive, all the diseased plants must be pulled up and carefully burnt ; water with 300 grammes of sulphide of carbon per square metre, and allow to rest for 1 or 2 months, during which time a fresh sprinkling must be effected.

In addition, the parts of the plant above ground may be treated with Bordeaux mixture because *Alternaria tenuis* may be said to be nothing but a late saprophite. All implements which have been used to w rk contaminated soil must be cleaned with the utmost care before being employed in new or disinfected soils.

3057 United States **Insects injurious to Currant and Gooseberry Bushes.** — See above, Abstr. 3018

(1) With a proportion of 5 cubic centimetres of sulphide of carbon per 4 litres of earth the vine inevitably dies; 2 cubic centimetres of this substance injected into the same quantity of earth may still have an injurious action on a pot plant. (1 cub. cm. = 0.061 cub. in).

In Germany, Mr. Hollrung noted the good results obtained from the use of sulphide of carbon in combating *Heterodera Schachtii,* but big doses were necessary, that is to say 1 800 kgs. per hectare, distributed in holes at regular distances of 50 centimetres. (E. BOURCART, *Les maladies des plantes,* pp. 76 and 90. Paris, 1910). (*Ed.*).

P. Noel. **The Enemies of the Vine.** — *Bulletin du Laboratoire régional d'Entomologie agricole*, 3e trimestre de 1911. (Juilletf Août-Septembre 1911), pp. 5-14. Rouen 1911. 3058

A list of animal and vegetable parasites and other enemies o the Vine. France

The list includes 60 Coleoptera, 12 Orthoptera, 29 Hemiptera, 2 Nevroptera, 3 Hymenoptera, 32 Lepidoptera, 5 Diptera, 8 Acarids, 1 Myriapod and 1 Nematode,

Next follow 28 fungoid diseases and 8 other different diseases of the Vine.

P. La. **Calendar of Treatments in Viticulture**, — *Revue Scientifique*, 49e année, 2e sem., No. 6, p. 181. Paris, 5 Août 1911. 3059

Under the title: *Calendrier de la Défense*, the Phytopathological Station of Villefranche-sur-Saone, directed by M. Vermorel, has just published a table which shows the incessant struggle which the vine growers of to-day are required to maintain against parasites. France

There is further to be added, as diseases of the Vine ; Anthracnosis, against which sulphur washes are used in winter, and the diseases produced by insects, such as the Urbec and Flea-beetles, which must be destroyed at the time of budding.

The table is as follows:

	Pyralis	Cochylis	Eudemis
January	Barking, Covering with a hand-glass, Scalding.	Barking, Scalding.	Barking, Scalding.
February	Do. do. do.	Do. do. do.	Do. do.
March	Do. do. do.	Do. do. do.	Do. do.
April	Insecticides; Arsenic, Nicotine.	Lantern traps	Lantern traps.
May	Do. do. do.	Do. do. Arsenical Compounds.	Do. do. Arsenical Compounds.
June	Do. do. do.	—	Do. do. do.
July	Lantern traps.	Lantern traps, Nicotine, Pyrethrum, Barium.	Do. do. Nicotine, Pyrethrum, Barium.
August	Collecting Grubs	Pyrethrum, Barium	Pyrethrum, Barium.
September	—	—	Lantern traps.
October	Scalding	Scalding.	Scalding.
November	Do.	—	Do.
December	Do. Barking	Scalding, Barking.	Do. Barking.

	"Mildew"	"Black-Rot"	"Oidium"
May	1st spraying when buds are 15 cm. long.	1st spraying when buds are 15 cm. long.	1st sulphuring when beds are 15 cm. long.
June	2nd spraying	2nd and 3rd spraying	Sulphuring at flowering-time.
July	3rd spraying	4th spraying	Sulphuring 3 weeks before beginning to colour.
August	Do.	Do.	Do.
September	Do.	Do.	Repeat sulphuring in case of extensive inroads. Replace sulphur by polysulphides in rainy parts.
	Repeat spraying whenever weather is both wet and hot.	Repeat spraying whenever weather is both wet and hot.	

SCHWANGART **Importance of Chemical Methods in combating the *Conchylis ambiguella* Rübn. Schiff.** (Die Bedeutung der Chemikalien als Bekampfungsmittel gegen die beiden Arten des Traubenwicklers (*Clythris ambiguella* Hübn. und *Polychrosis botrana* Schiff.). 26ter DeutscherWeinbaukongress in Würzburg von 8-11 September 1910). — *Chemiker-Zeitung*, Jahrg. XXXV, No. 114, p. 1048. Cothen, 23 September 1911. 3060

The author attributes great importance to the complete adoption of mechanical and biological (winter) methods of combating these pests and would like chemical processes to be used only as subsidiary means. From the experiments of the lecturer, the steps taken at the beginning of summer to prevent the first generation of the grubs, the "Heuwurm" of the wine grower, are not sufficient. Owing to the irregular appearance of the insect and simultaneous transformations along with the changes in the Vine inflorescence, the damage caused by insects of whatever species they may be, is largely eliminated. A more certain and effective method is chemical treatment against the generation which appears at the end of the summer, ("Sauerwurm"); and particularly the combined treatment of the grapes with tobacco juice and soft soap, which was entirely successful. In consequence of these experiments the free importation of foreign juice has been allowed, when it is to be used for this purpose. Germany

Insects Injurious to the Vine, in India. — See above, Abstr. 2661. 3061 British India

FREDERICK Z. HARTZELL. **Grape Insects in the Chautauqua Grape Belt, New York State.** (A Preliminary Report on Grape Insects). — *New York Agr. Exp. Sta. Bul.*, No 331, pp. 485-581. Geneva, N. Y., December, 1910. 3062

The bulletin under review is summarized as follows:

« The Chautauqua grape belt is the most important grape region in New York State. The gradual decline in productiveness during the last decade, notwithstanding the fact that the acreage has been greatly increased, is due in part to the depredations of injurious insects which feed on the vines. United States

A number of important insects have been studied during the past two years. This bulletin is a report of the studies on the

« grape flea beetle » (*Haltica chalybea*, Illiger), the « grape-blossom midge » (*Contarinia Johnsonii* Sling.), the « rose chafer » (*Macrodactylus subspinosus* Fabr.), the « grape root worm » (*Fidia viticida* Walsh.) and the « grape leaf-hopper » (*Typhlocyba comes* Say).

The grape flea beetle is a small, steel-blue beetle which feeds on the swelling buds. The beetles appear during April and feed during the warmer days. Mating takes place during a period of nearly two months. Egg-laying extends over a period of nearly two and a half months, but the greatest number of eggs are laid during a month and a half extending from about May 1 to the middle of June. The eggs are laid in the canes of the grape. The number of eggs laid by a female was found to vary from 5 to 103. The eggs hatch the latter part of June and early July, and the larvae feed upon the foliage, reaching full development in about three weeks.

The larvae form cells in the ground and pupate in about three weeks. The adult beetles feed on the grape foliage, and later in the fall seek sheltered places to hibernate. The most efficient spraying mixture is composed of 8 lbs of arsenate of lead, 3 gals. of glucose, and 100 gals. water. This is applied in the spring as the beetles are feeding on the vines.

The use of the same spray will kill the larvae if applied the first part of July.

The grape blossom midge is found in Chautauqua county, especially on early varieties of grapes. The adult midges emerge from the soil during the latter part of May and the first week in June. They mate soon after emergence and egg-laying begins. The females deposit the eggs in the blossom buds and soon perish. The eggs hatch in a few days and the larvae feed on the pistil of the blossom bud. The work of the larvae prevents the development of the buds which consequently produce no fruit. The feeding of the larvae causes the buds to have an enlarged appearance and to become red in color. The larvae feed about two weeks, and then pass from the buds to the soil, where they remain until the following spring. These larvae form hibernating cocoons. Pupae were found the first part of May. The pupal stage is at least three weeks in length. The use of a nicotine preparation as a spray was found to diminish the number of eggs laid.

The « rose chafer » is a serious enemy of the grape when it is numerous. The adult beetles feed on the blossoms, and are thus able to destroy the entire crop. The adults emerge from the soil about the 20th of June, almost always when the Concord grapes are beginning to blossom. Mating takes place during the time

the adults are feeding. The females burrow into the soil and deposit their eggs. They usually deposit them in sandy soil. The eggs hatch by the first week in August and the larvae feed on the roots of grass until November, when they burrow to a depth of about a foot, and form larval chambers in which they pass the winter. In April they leave these chambers and resume feeding. During the latter part of May the larvae form cells in which they change to pupae. The pupal stage lasts from three to four weeks. Experiments were made with various insecticides to kill the rose-chafer, and a mixture consisting of 10 lbs. of arsenate of lead, 25 lbs. of glucose and 100 gals. (American) of water was found to be very effective in killing the insects. The net gain per acre over the unsprayed grapes was 61.84 dollars. Experiments proved that the numbers of the rose-chafer could be materially reduced by cultivating the soil when the insects are in the pupal stage.

The « grape root worm » is the most serious insect pest of grapes in Chautauqua county. The larvae feed on the roots of the vine. The adults appear the latter part of June or the early part of July, and feed on the foliage. The eggs are laid underneath the bark, principally on the cane. These hatch during the latter part of July and during Augnst. The young larvae pass to the grape roots and feed until the fall. They then burrow deeper and form hibernating cells, which they leave in May and some of them will feed. The larvae form cells several inches beneath the surface of the soil about June 1st or a little later when they change to pupae. The pupal stage lasts several weeks.

The most efficient method of controlling this insect is to spray the vines with an arsenical poison, preferably arsenate of lead, when the beetles are feeding. This is usually combined with Bordeaux mixture. Experiments during 1910 appear to show that the use of a gallon (American) of molasses, 6 lbs. of arsenate of lead and 100 gals. (American) of water is a very effective treatment.

The experiments with the grape leaf-hopper (1) show that the nymphs are very easily killed by the use of a nicotine preparation, guaranteed to contain 2.7 per cent nicotine, and diluted with 65 to 100 parts of water. Lime-sulphur solution 1 gallon to 100 gallons of water proved very effective against the leaf-hopper nymphs, but it generally caused much injury to grape-foliage and fruit.

(1) See No. 1591 of this *Bulletin* for May, 1911.

3063 ALDO PAVARI. **Diseases of the Olive Tree.** (Alcune malattie minori dell'Olivo). — *Il Villaggio*, No. 1828, p. 327. Milano, 8 Luglio 1911.

The following are reckoned among the most serious pests of the olive tree:

Insects: The olive fly (*Dacus Oleae*), the moth (*Tinea oleaella* Italy or *Prays oleaellus*) and the scolytus (*Phloeothrvps oleae*) which a few years ago made its appearance in Liguria, where it is causing very extensive damage.

Fungi: *Cycloconium oleaginum* which produces the leaf blotch (termed « vaiuolo », « occhio di pavone », in Italy), and the *Capnodium olaeophilum*, which gives rise to « fumago », and is very often found associated with the scale insect *Lecanium oleae*.

In addition to these pests, which are frequently the sources of the very gravest injury, there are others which, though not so common or wide-spread, nevertheless are at times exceptionally aggressive and work no small havoc.

Among these secondary enemies of the insect class is the scale insect *Philippia oleae*, which is rife above all in the south of Italy. The *Philippia* is less injurious than *Lecanium*, because it does not, like the latter, form a nutritive substratum favourable to the development of « fumago », and consequently does not cause the appearance of the latter. The *Philippia* is pursued and effectively kept under by a number of natural enemies, which may be divided into two categories:

1) Egg-hunters, such as *Leucopis* (Dipter), *Sidis biguttatus* (Coleoptera), *Scutellista cyanea* (Hymenoptera); 2) Endophagous parasites such as *Coccophagus flavoscutellum*, *C. Howardi*, *Aphicus Philippiae* (Hymenoptera); *Mycroteris lunatus*, *Pachineuron* sp.

Among secondary diseases of fungoid origin, the author mentions *Cylindrosporium olivae*, which has during the last few years caused no little damage in the province of Siena.

It appears that treatment with copper salts, which is excellent against *Cycloconium*, is none the less so against *Cylindrosporium*.

3064 GIOVANNI MARTELLI. **The *Hylesinus* of the Olive Tree. (*Hylesinus oleiperda* F.).** (Ilesino dell'Olivo). — *Rinascenza Agricola*, anno III, No. 15, pp. 3-5. Caltagirone, 15 agosto, 1911.

The writer gives a description from the systematic and biolo- Italy gical point of view of *Hylesinus oleiperda* F., a Coleopter injuring

the olive tree. It prefers to attack trees in bad condition, which are already assailed by other insects ; therefore it still further deteriorates their condition. It is advisable to cut off and burn the lesser branches, where the heart wood and sap wood are furrowed by the insect. These branches are easy to recognise by the apertures of the burrows, and by a small reddish brown spot on the bark above them. It will be as well also not to neglect the ordinary measures of good tillage, and in the case of new plantations, strong varieties of olive trees should be used.

P. Guicciardini. **Experiments in the Province of Florence against the Olive Fly *(Dacus oleae)*** (1). (Il primo esperimento in provincia di Firenze contro la Mosca delle Olive). Relazione degli esperimenti eseguiti nelle colline di Montopoli e S. Miniato per la difesa contro il *Dacus oleae*, Luglio-Novembre, 1910. — *Atti della Reale Accademia Economico-Agraria dei Georgofili di Firenze*, anno 158, disp. 2, pp. 101-113. Firenze, 1911. 3065

In some olive groves on the hills of Montopoli and S. Miniato, province of Florence, experiments were carried out in 1910 in combating the olive fly. De Cillis wash was used, as modified by Berlese, and consisting, as is well known, of 70 parts of molasses and two of arseniate of potassium, mixed with 28 parts of water. This mixture before being used as a spray is diluted in 9 parts of water. **Italy: Tuscany**

At Montopoli, where the treatment had the twofold object of ascertaining the efficacy of the remedy, and its practical value from the economic point of view, there was chosen for the experiment a zone as thoroughly isolated as the conditions of the district allowed, and it comprised 8117 plants.

The treatments carried out numbered 7, owing to the very favourable weather in July, August, and early September. In each of the first two cases, each plant received about 350 grammes of wash, and this, in subsequent washings, was raised to about 500 grammes for the biggest aud most robust plants. For this treatment there were used 1350 kgs. of molasses and 38 kgs. of arseniate, costing altogether 197.10 frs. ; reckoning labour at 2 frs. a man per day the work being out of the usual run, the amount was 463.10 frs., or 0.05-0.06 frs. for each of the 8117 olive trees.

(1) Cf. Abst. 1051, *Bull.* March 1911. (*Ed.*).

The results obtained were strikingly conclusive, as will be seen from the following table, which shows the proportion of fruits infected by the fly out of 200 olives gathered from each of the control groves, and from the groves of the zone treated, as this proportion was found on the 10th November, one month after the last application of wash, and 10 days after in the same olive groves, but from olives gathered in equal quantities from other trees:

	10th November	20th November
1) Control grove	30 % infection	32 % infection
2) Second control grove	42 % »	45 % »
3) Grove near others not treated	7 % »	10 % »
4) Treated grove	3 % »	2 % »
5) Another treated grove	2 % »	1 % »

At S. Miniato the treatments which were carried out at almost the same time as at Montopoli, numbered four, one of which could not be completed owing to the bad weather. The zone selected was entirely isolated.

The following are the results obtained in various plantations:

1st plantation:

Olive groves treated (central zone) . . . . . ½ % infection
» » » (outer ») . . . . . 1 % »

2nd plantation:

Olive groves treated (central zone) . . . . . 1 % »
» » » (outer ») . . . . . 3 % »

3rd plantation:

Olive groves treated (central zone) . . . . . 0 % »
» » » (outer ») . . . . . 0 % »
» » » (outer zone not well isolated) 3 % »
Control groves . . . . . 23 % »
» » . . . . . 27 % »

The expenses involved in this treatment in the three plantations did not exceed 3 centimes per plant.

Although the results obtained proved the excellence of the method by spraying, this method, according to the author, nevertheless, has serious drawbacks. For instance, the necessity of repeating the treatment at least every fortnight, when the weather is favourable, or in the contrary case, after every rain, heavy or light; the danger of promoting the development of « fumago » by the

sugary contents of the wash; the difficulty of preparing this wash properly; the spraying of the plants and fruits with substances, poisonous even to man; the large quantity of water required for the wash and the expense of transport it entails, especially if the water is distant; and lastly, in some regions, where malaria prevails, the shortage of labour at the time when most needed.

For all these reasons the writer expresses the hope that the method of spraying should be replaced by the so called dry method, which while yielding more satisfactory practical results, obviates the difficulties just enumerated.

P. NOEL. **Pests of the Walnut Tree**. — *Bulletin du Laboratoire regional d' Entomologie agricole*, 3e trimestre de 1911 (Juillet-Août-Septembre) pp. 15-16. Rouen 1911. **3066**

The writer mentions among the pests of walnut trees, three coleoptera, four hemiptera, eight lepidoptera, three acarids, and three fungi. **France**

***Aspidiotus destructor*. Scale Insect Injurions to Cocoa-nuts in Antigua and in the Bombay Presidency.** — See above: No. 2688. **3067 Antigua. Bombay Presidency.**

E. P. STEBBING. **Pests of the Deodar** (***Cedrus Deodara*** Lond., ***C. Libani*** Barrel.) *in India*. — *Nature*, Vol. 87, No. 2185, p. 371. London. **3068**

Part. I, of vol. II, of the entomological series of Indian Forest Memoirs, by Mr. E. P. Stebbing, contains a detailed account of the pests of the Deodar, and some sketches of the insects that have been observed to prey upon some of these pests. The information should be extremely useful to forest officers of every grade. The number of pests, mostly from the Deodar forests of the N. W. Himalaya, which the writer discusses, include fourteen species of beetles, six species of lepidopterous caterpillars, and two saw-fly caterpillars, the majority of which are specifically identified, those that are not named being sufficiently described and figured for recognition by the forest conservator. Among the injurious beetles, three species of *S olytus*, which are regarded as especially destructive in the area specified, are said to be quite peculiar to the Deodar. Of insects that attack some of the commoner of the foes of this tree, four parasitic *Hymenoptera* and three predaceous beetles are mentioned. The plan of the memoir is good. Each species, so far as the present state of knowledge allows, is described and figured in the several stages of its existence, in the **British India**

more important phases of its activity, and in its local and constitutional effects upon the tree. Damages also are adjudged, and treatment is suggested.

3069 GIACOMO DEL GUERCIO. **Enquiry into two Abnormalities of the Canadian Poplar and the Willow.** (Intorno a due gravi alterazioni del Pioppo del Canada e del Salcio. — *Atti della Reale Accademia economico-agraria dei Georgofili di Firenze*, serie 5ª, vol. VIII, disp. 3ª-4ª, pp. 228-237, Firenze, 2 settembre 1911.

Italy

The writer examined a branch of Canadian Poplar which exhibited numerous irregular prominences, smooth, light chestnut in colour, and varied depressions. These phenomena, which involve only the bark layer, are due to *Aspidiotus Betulae* Bar. This insect is combated in Italy by a parasite of the Chalcididae; nevertheless, if, as is the case, the Canadian Poplar offered the insect better conditions of life and prolification, the insect would probably succeed in seriously injuring the tree in question, in spite of the presence of its enemy.

The *A. Betulae* lives on horse chestnuts, lime trees, birches, olive trees, etc., behaving differently on different plants.

The writer remarks that in the country of its origin, the Canadian Poplar has another and perhaps more formidable enemy, the *Schizoneura Populi* C. P. Gillette (= *Pachypappa Populi* Del Guercio).

Symptons similar to these referred to in the Canadian Poplar were observed by the writer on two willow branches. They were due to *Mytilaspis pomorum* Bouché, which like *A. Betulae*, produced different phenomena, according to the host plants (pear tree, apple tree, poplar, fig tree, hawthorn bush, vine, *Salix*, sp.).

The poplar and the willow being deciduous, it is possible to defend them effectively, even in winter. By cutting and pruning, the surface requiring protection may be reduced, and then treated with more or less concentrated liquids, containing oil of tar and alkaline substances, or with sulphur and lime used separately or mixed in different ways with other preparations of well known efficacy. To destroy the larvae, solutions of 1½ - 2% suffice, while for the full grown insects, 10 % solutions are needed. Protective measures against the grubs of *M. pomorum* must begin about the end of April or beginning of May. The grubs of the first generation are born in about fifteen days; two sprayings, one with a 1 % solution, and the second with a 2 % solution will suffice. Afterwards, more concentrated solutions must be used. For the second

generation of grubs, the birth of which takes place between the end of July and the beginning of August, the same rules are to be observed.

To combat *A. Betulae*, the time for taking these measures (mixture containing tar oil) during the winter is the same; nevertheless, as the period occupied by the birth of *Aspidiotus* grubs is at least double that given above for *Mytilaspis*, the treatment must be repeated twice in succession, after the first operation, with solutions of 1 ½-2 % and 3-3 ½ %; an interval of 12 to 15 days being left between the two operations.

The writer gives a detailed description of the method employed in using the freshly prepared mixture of sulphur and lime. To secure effective treatment, 8 lbs. of sulphur must be mixed with 6.6 lbs. of good lime previously slaked in 1.4 gals. of water, and the whole boiled for about an hour. 3.2 gals. of water at ordinary temperature, are then added and the wash is stirred until a homogeneous mixture is obtained, when it is applied without delay.

The beneficial effects of this wash are only perceived on plants where the scale insects generally form no layers; it is in any case less expensive than the tar oil mixture, and it is easier to get it pure and effective, etc. The two classes of preparations referred to, also possess the property of rendering immune a large part of the branches by the residues left as deposits after treatment with these washes.

P. BARGAGLI. ***Cryptorrhynchus Lapathi*, Coleopteron attacking *Populus canadensis* Desf.** (Di un altro insetto nocivo al Populus canadensis Desf.). — *Atti della R. Accademia economico-agraria dei Georgofili di Firenze*, serie 5ª, vol. VIII, disp. 3ª-4ª, pp. 250-253. Firenze, 2 Settembre 1911. **3070**

In June of this year at Certignano, near Castelfranco di Sopra, Province of Arezzo, the writer observed extensive injury caused by a coleopter of the subdivision of the Rhincophorae, the *Cryptorrhynchus Lapathi*, on about one hundred small two year old Canadian poplars (*Populus canadensis* Desf.). The attacks of the insects were chiefly visible on plants in the shade, and appeared at the base in the form of excrescences, swellings and cracks of the bark. The parasite, in the grub form, first produced erosions through the bark and the wood, digging its gallery deeper and deeper into the wood, vertically, and sometimes reaching the pith. At the end of the gallery the insect hollows out an oval chamber in which it carries out its metamorphosis into the state of nymph, **Italy: Tuscany**

and perfect insect. The writer advises planting poplars at a fairly large distance from each other, and burning, before the summer, those trees which appear withered and have excrescences at their base, in order to prevent the development of the insects they contain, and guard against the fresh injury which might result from the laying of the eggs.

3071 Madagascar **Insects injurious to the Tapia *(Crysopia macrophylla,* Cambess).** See above, Abstr. 2715.

Other Pests.

3072 **Snakes and Wiid Animals in India.** — *Journal of the Royal Society of Arts*, No. 3070, p. 1028, London, Sept. 22, 1911.

British India The number of lives lost in India from snake bites instead of diminishing, shows a lamentable tendency to rise. According to a stutement published by the Home Department of the Government of India, the total of deaths from this cause in 1910 was 22 478, an increase of 1114 over the figure for 1909, and of 2740 over that of 1908.

The increase in Eastern Bengal and Assam is attributed to snakes being driven by high floods to take refuge in the raised village sites. Both in this province and in the United Provinces a considerable number of cases were treated with the Brunton lancet and permauganate of potash, and a large proportion of them are reported to have recovered. No reliable deduction can, however, be drawn from the use of this lancet, owing to the lack of proof that the bites it was used upon were really those of poisonous snakes. The number of persons killed by wild animals last year was 2400, compared with 2496 in 1909; 55 were killed by elephants, 853 by tigers, 351 by leopards, 109 by bears, 319 by wolves, 25 by hyaenas, and 688 by « other animals ». Some idea of the damage done by wild animals may be gathered from the fact that no fewer than 93 074 cattle were destroyed by them in 1910.

The figures upon the other side of the account are also striking. The number of wild animals killed in 1910 was as follows: elephants 23; tigers 1421; leopards 5029; bears 2292; wolves 3114; hyaenas 414; snakes 91104 and other animals 6989.

The Destruction of Rats (1). — *Board of Agriculture and Fisheries*, Leaflet No. 244, June, 1911. 3073

Two kinds of rats are found in Great Britain, the Black Rat (*Mus rattus*), and the Brown Rat, sometimes called the Hanoverian or the Sewer Rat (*Mus decumanus*). The former, which has been longer established in the United Kingdon is the smaller of the two. Great Britain

A number of measures may be adopted to prevent damage by rats. Cutting off their food supply discourages their presence and prolific breeding. Among these measures may be mentioned:

a) Building ricks and granaries on rat-proof piles:

b) Rendering buildings as rat-proof as possible by means of concrete foundations, brick-work laid in cement, and galvanised iron sheeting:

c) The use of concrete or metal grain and meal bins in stables and elsewhere, and covering the angles of wooden receptacles already in use with tin sheeting:

d) Proper construction, protection and repair of drain pipes, ventilators, and basement windows, so as to make each dwelling or building as far as possible rat-proof:

e) The disposal of garbage, refuse and waste food, so that it is not available for rats; this is particularly important on the farm, in slaughter-houses, and in factories:

f) The protection of the natural enemies of rats.

The natural enemies of rats are numerous, and, considering the prevalence of these rodents, their foes are deserving of every recognition. Owls, hawks, buzzards, rooks, crows, ravens, sea-gulls, stoats, weasels, and foxes are all well-known enemies of rats, mice and voles. Cases showing the proclivity of owls for rats are numerous; it will suffice to mention one instance, in which Seebohm states that 20 freshly-killed rats were found in the nest of a barn owl. The wanton destruction of many of the birds mentioned above is strongly to be deprecated.

Remedial Measures. — There are three methods which may be employed in the destruction of rats: 1) *Hunting;* 2) *Trapping;* 3) *The use of poisons, rat virus, or fumigation.*

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(1) See *The Science and Practice of Farming during 1910 in Great Britain*, p. 369. Intern. Inst. of Agric. Rome, 1910.

See also Abstracts 361-362 *Bull.* Jan. 1911: Abstract 1328, *Bull.* April 1911, and Abstracts 2016-2017 *Bull.* June 1911. (*Ed.*).

Rat viruses, of which there are several on the market, can be used without fear of direct injury to any animals other than rodents. These viruses are believed to be composed in every case of a culture of a microbe causing a specific disease of rats, which in some cases at any rate is contagious, so that the inoculated rat conveys the disease to his fellows. The uncertainty with which this method is attended is due partly to the difficulty of securing a successful infection in all cases, and partly to the fact, that, if only slightly infected, rats recover and thereafter become more or less immune to the disease.

Reliance should not be placed in any one of the methods referred to above, but as far as possible *all these methods shonld be employed*. A combined effort should be made simultaneously, the attack in each instance commencing on the boundary and working gradually towards a central spot, such as a group of ricks, where it is considered that the final work of destruction can be accomplished with least difficulty. Rat hunts should be organised all round the boundary of the area, and traps and poison should be laid on the outside. Every precaution should be taken to see that no rats escape outwards. Their holes should be closed, and their runs and nests destroyed as the cordon is gradually drawn closer.

In the case of large districts, a number of adjoining areas such as that described above might usefully be mapped out and dealt with simultaneously.

A somewhat similar system which is frequently adopted consists in the formation of a rat club as described in Leaflet 84. By means of small subscriptions from farmers and landowners, a fund is provided out of which prize money is paid in proportion to the number of rats caught by the members, who are usually agricultural labourers. In the case of one club in Kent with less than 20 working members, it is stated that some 16 000 rats were destroyed in the course of three seasons.

This system, though it does not secure the extermination of the rats in a district, is a useful means of keeping them in check at a relatively small expense.

3074 M. DE KRUYFF. **Destruction of Rats in Java.** — *Nature*, Vol. 87, p. 335, London, Sept. 7, 1911.

Dutch East Indies: Java

The following method for the destruction of rats, adopted by M. de Kruyff, of the Agricultural Bureau of the Dutch East Indies at Buitenzorg, Java, is given in a recent American consular report.

All visible rat holes were first stopped with earth to ascertain which holes were inhabited. Half a teaspoonful of carbon disulphide was then poured in each of the holes found to be inhabited, and after a delay of a few seconds to allow the liquid to evaporate, the mixture of vapour and air was ignited. The result was a small explosion, which filled the hole with poisonous gases and killed all the rats almost instantly. A pound of carbon disulphide is sufficient for more than 200 rat holes; 131 dead rats were found in forty three holes which were opened after the operation. It is further stated that satisfactory results in exterminating porcupines have been obtained by this method.

C. J. Cooke. (Brit. Consul). **Locust Plague** (1) **in Greece.** (Report for the Year 1910 on the Trade and Agriculture of the Piraeus and District. No. 4750). — *Annual Series, Diplomatic and Consular Reports, Greece*, p. 20. London, July, 1910. **3075**

During the last two or three years a great part of continental Greece has been invaded by locusts. In certain districts, the crops were badly damaged, last season. In some cases, attempts to control the plague have been made by the syndics and by large landowners, but hitherto no really organised action has been taken for the extermination of locusts. It is believed that henceforward a systematic campaign against them will be undertaken.

A. Acloque. **Wasp Destruction.** — *La Nature*, 39e année, No. 1907, p. 110. Paris, 2 Septembre 1911. **3076**

There is no lack of methods for the destruction of wasps. The following are a few.

A very simple, rapid, and cheap method consists in placing over the wasp's nest, before the insects emerge in the morning, a **France**

(1) See p. 376 *Bull.* Dec. 1910 ; Abstrs. 658-659 and 706 *Bull.* Feb. 1911. Abstrs 1561, 1572, 1578-1580 *Bull.* May 1911; Abstrs. 1960 and 2030 *Bull.* June 1911; Abstrs. 2322, 2333 and 2380-2381 *Bull.* July 1911.

It has been recognized that the bodies of locusts heaped on the soil form an excellent manure.

The following analysis has been made at Cagliari (Sardinia) :

Phosphoric acid	1.92 %	1.89 %
Phosphate of lime	4.21 »	4.13 »
Nitrogen	10.14 »	10.64 »
Ammonia	12.31 «	12.22 »

See Αἱ ἀκρίδες ὡς λίπασμα. Δελτίον, Ἔτος Γ. Ἀριθ. 8, σελ. 256. Ἀθῆναι, Αὔγ. 1911. (*Ed.*).

large white glass bell as used for melon growing. The rays of the sun speedily heat the atmosphere inside the glass to such an extent that the wasps die of suffocation. As a further precaution, a basin half filled with soap water may be placed beneath the glass to drown the wasps, which have not been suffocated. By this means all the inhabitants of a well populated wasp nest can be destroyed in a few days.

If the nest is built in a wall, the following method may be adopted:

Boil a quantity of old leather; this produces a kind of glue, which mixed with tallow should be laid in several successive coatings on the wall. The wasps are imprisoned and die of hunger.

Another method, which is in a way, derived from the foregoing, differs only in the materials used. It is very effective and is certainly one of the least expensive, and consists in mixing plaster of Paris with water and pouring it while still quite liquid into the nest; this plaster makes its way into the smallest cracks, and fits closely against the entire surface of the inside cavity of the wasp nest; it sets in a lump and swallows up the entire population; perfect insects, grubs, eggs, and everything.

Of course the operation must be carried out at night.

3077 F. Stewart Macdougall. **A New Enemy of Sheep**. — *Transactions of the Highland and Agric. Soc, of Scotland*, vol. XXIII, p. 147. Edinburgh 1911.

Great Britain: Scotland

This article deals with various insect pests which proved very destructive in 1910. Much harm was done to sheep by a new foe, *Proto-Calliphora Groenlandica*, Zett. This fly comes near the green bottles (*Lucilia*) and the blue bottles (*Calliphora*). It differs from the greenbottles in not having a bright metallic thorax and abdomen, and from the bluebottles in having the parts below the cheeks and the eyes black, with black hairs, Further in *Proto-calliphora* the 3rd longitudinal vein of the wing has little spines on most of its first section, and the wings, when the fly is at rest are held parallel to the body, whereas in Calliphora the 3rd longitudinal vein is spiny at the base only, and its wings, when the fly is at rest, are held at an angle to the body.

There are two species of *Proto-calliphora*, viz. *azurea*, the less common, and *groenlandica*. The former, blue-green in colour, is credited with laying its eggs on nestling birds. P. *groenlandica*, a black-blue fly, is stated to lay its eggs on putrefying animal matter.

but in the past year an interesting feature in its biology has been proved, namely that the fly « strikes » live sheep, and that its maggots, like those of *Lucilia sericata* and *Calliphora erythrocephala*, are harmful to the sheep.

On May 6 1910, the writer received some maggots taken on May 4 from a live blackfaced ewe going on old grass pasture. The early date is interesting, considering that April 1910 was one of the coldest Aprils on record. The maggots were fed on mutton. and these having completed their growth, and pupated, over twenty of the adult flies were obtained in the last days of May and on June 1st and 2nd.

Destruction of Flies by Sanitation in the Farm. Sanitary Privies. — See above, Abstr. 2424. 3078 United States

Destruction of the Common Fly. — *La Nature*, No. 1909, p. 126. Paris, 16 Septembre 1911. 3079

The common fly lays its eggs as a rule on the excreta of Mammifera, especially of the horse, and the fly grubs complete their entire development in these substances. By suitably treating these excreta it is possible to prevent the development of the grubs, and consequently, the appearance of the adults. This cannot be done without an expenditure of time and money, but if it be borne in mind that flies are not only troublesome and dirty insects, but they are, in addition, highly dangerous, because they are capable of transmitting serious infectious diseases (enteric fever), there should be no hesitation in taking the necessary steps to destroy them. France

Stable dung should be removed every day, or at least once a week; it should be collected either in a special pit or in a compartment which mu-t be carefully partitioned off at one of the sides of the stable, or one of its ends. This compartment must communicate with the outside so as to allow of the dung being easily removed. The excreta brought in daily or weekly must be sprinkled on the surface with commercial chloride of lime. For this purpose it is desirable to have always at hand a barrel of this substance.

Parasites of the « Landibe » (*Borocera madagascariensis*), Madagascar Silk-Worm. — See above, Abstr. 2715. 3080 Madagascar

3081 Barbadoes **Mosquito Larvae in Drinking Waler.** — See above. Abstr. 2426.

3082 J. KÜNCKEL D'HERCULAIS. **Observations on the Habits of a Myriapod, *Scutigera Coleoptrata*.** (Its Usefulness as a Fly Destroyer; Action of its Poison; Fanciful Reports of its accidental Presence in the Digestive Organs of Man). — *Comptes rendus hebdom. des séances de l'Acad. des Sciences*, T. 153, N°. 6, p. 399. Paris 7 Août 1911.

The habits of the insects sheltered by our homes are far less known than is generally believed. A myriapod has recently at-
France tracted attention, (*Scutigera Coleoptrata* Lin., 1758); it lives in houses and dwellings where damp exists even in a slight degree, hiding by day in the crevices of the doors and windows or any crack in which he can insert his thirty extremely long legs.

The *Scutigera* genus is very wide-spread. In Australia *Scutigera Smithii* Newport, lives, observed by Dr. W. Haacke (1885 and 1886); in the United States *Scutigera forceps* Rafinesque is found, studied by Miss Kate Rondeau (1890); these two species hunt the house fly by night; another American observer, Miss Marie Murtfeld (1893), saw *Sc. forceps* capture large *Haploa* butterflies of 20 inches across the extended wings, akin to our Callimorpha, which were attracted by the light of a lamp.

The writer often found *Scutigera coleoptrata* at his home at Conflans-Sainte-Honorine (Seine-et-Oise), where it takes up its abode by preference in privies, he was able to catch it during the night as it hunted flies, and its chief prey was *Fannia scalaris* Fab., which come in large numbers, burning their wings in the candle flames and drowning themselves in the melted stearine (a thing never done by the house-fly, which is not attracted by artificial light). The presence of *Fannia scalaris* Fab in lavatories is explained by the fact that their grubs live in decomposing substances, both faecal residues and putrid fungi.

Although poisonous, the Scutigera is not generally dangerous, because it only makes use of its forceps in exceptional cases. When caught, it hastily leaves some of its legs between the fingers of its captor and scurries away. Only two cases of parasitism of this myriapod, in the digestive tube of man, has been found, and even these are, according to the writer, highly doubtful.

P. Bru. **Arsenical Compounds in Trypanosomiasis, Pyroplasmosis and Spirillosis.** (Les composés arsenicaux au point de vue thérapeutique). — *Revue Vétérinaire*, 38e (68e) année, Nos. 8 et 9, pp. 472-484 et 532-542. Toulouse, 1er Août et 1er Septembre 1911. 3083

The writer deals with the anti-infectious action of arsenical compounds, and discusses in particular the arsenical treatment which has been tried against various trypanosomiases; the "Surra", the causal agent of which is the *Trypanosoma Evansi*, and which is rife in the horse, the camel, the ox and the buffalo; the "Nagana" (*Tr. Brucei*), observed in the horse, the ox, and the antelope; the "Souma" (*Tr. Cazalbui*); the "Baleri" (*Tr. Pecaudi*); the trypanosomiasis of horses known as the "Gambie" (*Tr. dimorphon*) transmitted by various Tsétsé or Stomox flies. Experiments have also been made in relation to pyroplasmosis and spirillosis. **France. Tropical Africa**

The writer, in conclusion affirms that the anti-infectious action of preparations containing arsenic is real; but these compounds are still too poisonous, even the most recent of them. It is this toxic character which restricts their use, but which also forms the most important feature to be studied from the point of view of veterinary practice.

Legislative and Administrative Measures for the Protection of Plants.

Decree — in France — Concerning the Engagement of Assistant Professors and Controllers of the Department of Horticultural Plant Diseases Inspection (1). — *Journal Officiel de la République Française*, 43 année, No. 195, pp. 6101-6102. Paris, 21 Juillet 1911. 3084

The Minister of Agriculture, having seen the Decree of the 1st May 1911, establishing a diseases of plants inspection department for horticulture, and particularly Article 5 relating to the engagement of the staff, has decreed as follows under date of the 6th July 1911. **France**

(1) Cf. Abs. 1607, *Bulletin* for May 1911. (*Ed.*).

Article 1. — The assistant inspectors and controllers of the department of horticultural plant diseases inspection shall be engaged from among persons possessing the certificate qualifying them for that office, by way of competition by qualifications, on the conditions fixed below.

Qualifyng certificate for the office of assistant inspector.

Article 2. — Any candidate desirous of taking part in the competition must possess the diploma of the Agronomic Institute or the National Schools of Agriculture, that of licentiate of sciences, a higher education diploma equivalent to that of licentiate of science, or failing the above must be a specialist well known for his work in entomology or cryptogamy applied to cultivated plants.

Controllers Qualifyng Certificate.

Article 3. — Candidates before being allowed to compete must be engaged in a profession requiring extensive practical knowledge of botany or cryptogamy, or present substantial guarantees from the point of view of capacity to determine the characters of the insects and fungi most frequently found in agricultural and horticultural plantations.

Article 6. — The jury appointed to grant certificates qualifying for the office of assistant inspector and controller shall be made up as follows: The Director of Agriculture or his delegate ; the two inspectors and departmental chiefs, and two notabilities of the scientific world, particularly known for their work on applied cryptogamy or entomology.

Clause 9. As a temporary measure owing to urgency and to allow of organising the service, the office of assistant inspector and controller shall be exercised during the second half year of 1911 by specialists appointed by the Minister of Agriculture from a list to be submitted and drawn up by the inspectors and departmental chiefs.

3085 **Combating the Enemies of Plants in France.** — *Revue horticole*, 83e année, No. 10, p. 218. Paris, 16 Mai 1911.

The General Council of Doubs at its April, meeting voted a credit of 2 000 francs to encourage the destruction of cockchafers by premiums of 30 centimes per kg. of insects.

France : Doubs

The General Council voted a sum of 10 000 frs. for the destruction of ravens and field mice : a part of this grant will be devoted to testing the virus of the Pasteur Institute.

Permanent Commission for Studying the Conditions of Sale of Nicotine in France. — *Le Tabac*, 31e année, No. 494, p. 2. Paris, 6 Août 1911. 3086

M. René Besnard, Financial Under-Secretary of State in France has just appointed a permanent commission to study all questions relating to the conditions of sale of nicotine with the object of co-ordinating the efforts of the Administrations concerned. This commission, which is under the presidency of the Assistant Secretary of State for Finances, includes representatives of the Ministry of Agriculture, the Administration of Indirect Taxes, and the Administration of State Manufacturers. France

Duty-free Admission in Russia of Preparations for Combating Diseases of the Vine and Fruit Trees. — *The Board of Trade Journal* No. 770. p. 435. London, Aug. 31, 1911. 3087

With reference to the notice respecting the duty-free admission into Russia of preparations for combating the diseases of the vine and fruit trees, a list of the preparations allowed has been published. It is as follows: Sulphur, blue copperas, iron copperas, sulphocyanate of potassium, lead arsenic, sodium arsenite, polysulphides of sodium, acetate of copper, oxychlorate of calcium, bisulphide of calcium, formalin etc. Russia

Permission will also be given to the "Zemstvos", to agricultural societies and also to private firms, upon presentation, in every case, of a special voucher from the Department of Agriculture, or from persons duly authorised by the Department, who shall exercise supervision over the application of the preparations specified.

The Importation of Cotton Seed etc. into Turkey Forbidden. — Ἀπαγόρευσις εἰσαγωγῆς βαμβακοσπόρου κλπ. ἐν Τουρκίᾳ. Δελτίον· Ἔτος Γ. Ἀριθ. 8. σελ. 256: Ἀθηναῖς. Αὔγ. 1911. 3088

The Turkish Government has absolutely forbidden the importation of cotton seed, unginned cotton, cotton pods, and everything used in the carriage of cotton, on the ground of preventing the propagation of *Anthonomus grandis*, or « boll weevil ». Turkey

3089 G. Gordon Hewitt. **Injurious Insects and Plant Diseases Legislation in Canada.** — *The Gardeners' Chronicle*, Vol. 4, No. 1281 and 1282, pp. 21-24 and 44-45. London; July 15th and 22nd, 1911.

Canada

The Department of Canada is authorised by the « Destructive Insect and Pest Act of 1910 » to take every measure which may appear necessary to prevent the introduction and propagation of injurious insects, plant diseases and other pests. All plants, withl the exception of certain kinds, such as hothouse plants, perennias herbaceous plants and bulbs, may only be imported at certain time of the year and through certain ports specified in the Regulations. The Department of Agriculture has the power of inspecting the plants which may be infested by certain insects and certain diseases, of destroying these plants if need be, and of prohibiting their importation into Canada.

At six of the ports of entry, fumigation stations have been established where the plants from countries or regions which are or may be infected by the « San José Louse » (*Aspidiotus perniciosus*) are fumigated with hydrocyanic acid by special officers.

Plants from Europe, Japan and the States of Vermont, Maine, Massachusetts, New Hampshire, Connecticut and Rhode Island, are examined by the officers of the Department for « Gipsy Moth » (*Porthetria dispar*) and the « Brown-tail Moth » (*Euproctis chrysorrhoea*). In some cases this inspection is carried out at the port of entry, in other cases at the port of arrival of the goods. In the latter case, the plants may only be unpacked in the presence of an inspector.

All persons and companies importing or bringing plants into Canada must notify the Dominion Entomologist in Ottawa; furthermore, through the customs department, the customs officers at the ports of entry also send notices of the arrival of cargoes of plants to the various ports where the plants may enter.

In addition to the inspection and fumigation of imported plants, rural officers are employed to inspect orchards and enforce the necessary measures to keep down the « Brown-Tail Moth » in the infested regions of Nova Scotia and New Brunswick. This work of destruction is undertaken in co-operation with the respective provincial Governments. All the steps referred to previously are carried out under the direction of the Entomologist of the Dominion.

The Minister of Agriculture is empowered to prohibit the importation of plants from any region, when thought necessary, owing to the presence in that region of dangerous insects or diseases.

This has been done with regard to potatoes from Newfoundland and the neighbouring Islands in order to prevent the introduction of the « Potato Canker » (*Chrysophlyctis endobiotica*).

In addition to the Federal Government legislation, several Provincial Governments have taken legislative steps in connection with plant diseases and other farmers' pests.

British Columbia inspects all plants and fruits entering into the province; and all plants or fruits attacked by a dangerous insect are either treated or destroyed.

The legislation of the provinee of Ontario refers chiefly to the inspection of nurseries and plants from them.

The province of Nova Scotia recently put into operation legislative measures which authorise the Department of Agriculture of the province to inspect orchards, and take the steps deemed necessary for destroying the most dangerous insects and combating the most serious diseases of plants.

Regulations Completing the Act on Injurious Insects and Pests in Canada. (Memorandum). — *Dept. of Customs*, Canada, File N. 68,240, N. 1621 B, 4 pp. Ottawa, March 8th, 1911. 3090

1. — « Inspector » means a person appointed to carry out the enactments of the Act on dangerous insects and pests and the Regulations thereunder.

2. — No tree, plant or other vegetation or vegetable substance infested by any of the insects, pests or diseases to which this Law applies shall be imported into Canada except in the manners herein determined. Canada

3. — Consignments of nursery plants, including all trees, shrubs, plants, vines, grafts, scions, slips or buds entering Canada, shall only be imported through the ports and during the periods mentioned respectively, that is to say:

Vancouver, B. C., from the 1st October to the 1st May;

Niagara Falls, Ont., from the 1st October to the 15th May;

Winnipeg, Man., and St. John, N. B., from the 15th March to the 15th May, and from the 7th October to the 7th December;

Windsor, Ont., and St. John's, P. Q., from the 15th March to the 15th May, and from the 26th September to the 7th December.

At these ports of entry the goods imported will be subjected to fumigation in houses built for the purpose, and a fumigation certificate will be delivered, without which no consignment can leave the entrepôt.

Importations by post will be subject to the same regulations.

All consignments of nursery plants coming from Japan or one of the States of Vermont, New Hampshire, Maine, Massachusetts, Connecticut and Rhode Island (six of the United States of America) will, after fumigation, be submitted to the inspection directed in Article 6 of these Regulations.

Nevertheless, vegetation and florists' consignments will be exempted from fumigation, and may be imported at any season of the years and through any port without inspection :

a) Plants cultivated in hothouses including roses in leaf, which have grown in a flower-pot up to three inches diameter but not larger. A certificate showing that the plants have grown under glass must accompany the consignment and be signed by the consignor.

b) Perennial herbaceous plants (the stalks of which die during winter) such as the perennial Phlox, Peonies, Sunflowers, etc.

c) Herbaceous flower-bed plants, such as Geraniums, Verbena, Pansies, etc.

d) Bulbs and tubers, such as Hyacinths, Lilies, Narcissus and other bulbs as well as the tubers of Dahlias, the Rhizomes of the Iris, etc

e) The Necklace Poplar (*Populus deltoides*), when grown in Dakota or Minnesota (two of the United States of America).

4. — The port through which it is intended to bring nursery plants into the country shall be clearly indicated on each package, and for all shipments made under these Regulations the risk shall be borne entirely by the consignors or the consignees, the Government assuming no liability.

5. — All those importing nursery plants, except the shipments without fumigation or inspection (Article 3 of the Regulation), shall give notice to the Entomologist of the Dominion, Experimental Farm, Ottawa, within five days after forwarding the order for such importation, and they shall once more notify the Entomologist of the Dominion on the arrival of the cargo in Canada.

Notice shall also be given to the Entomologist of the Dominion by all the transporting companies, by the customs officers and the other persons importing or causing to enter into Canada shipments of nursery plants, subject to the inspection under the rules laid down herein, immediately after such advice of consignment has been received by them. Such advice shall contain the names of the consignee, the places of origin and destination, the name of the company transporting the consignment of nursery plants, and th nature, quantity and origin of such consignment.

6. — Consignments of nursery plants, including those excluded in Article 3 of these Regulations, coming from Europe, shall be imported only through the ports and during the periods specified in Article 3 dealing with the consignments requiring fumigation, with the addition of the ports of Halifax, N. S., Sherbrooke, P. Q. and Montreal, P. Q., through which European consignments may enter from the 15th September to the 15th May. Such European consignment of plants and such other vegetation as the Minister may determine, entering Canada, shall be exempted from fumigation, but shall be inspected either at the port of entry or at their place of destination, to which they may be allowed to go; in the latter case, however, they may not be unpacked except in the presence of an inspector.

7. — When it is found on inspection, that the consignment of nursery plants or other vegetation or vegetable substance is infected with the insects, field pests or diseases hereinafter specified, it shall be destroyed to the extent deemed necessary by the inspector and in the presence of the latter. All cases, packings and covers in which such shipment has been contained shall also be destroyed in the same way.

8. — Every inspector entering any field, nursery or other place where there is reason to believe that insects, pests or diseases, as hereinafter specified, are or may be found, shall give instructions for the treatment or destruction of each tree, shrub, crop or other vegetation or vegetable substance or their recipients, which are found or suspected to be infected by the insects, pest, or diseases hereinafter specified, and the said instructions shall be executed by the owner or the consignee of the vegetation, the vegetable substance or their recipients deemed infected or suspected, and such remedial treatment shall be carried out and continued until the insect, pest or disease is deemed by the inspector to be exterminated.

9. — Compensation not exceeding two-thirds of the value, as assessed by the Inspector, of the vegetation or vegetable substance or their recipients destroyed by the instructions of the Inspector, shall be granted by the Government in Council, on the recommendation of the Minister.

10. — It shall be unlawful to sell, offer for sale, dispose of or receive in any way whatsoever, trees, shrubs or other plants or vegetable substances, if infected by the insects, pests or diseases hereinafter specified.

11. — The owner, caretaker or tenant of any premises or places where the insects, pests or diseases hereinafter specified are

found, shall immediately give notice to the Minister, and shall also send him specimens of the insects, pests or diseases.

12. — The injurious insects, pests and diseases to which the said Act shall be applied are the follwing :

The San José Scale (*Aspidiotus perniciosus*) ;
The Brown Tail Moth (*Euproctis chrysorrhoea*) ;
The Woolly Aphis (*Schizoneura lanigera*) ;
The West Indian Peach Scale (*Aulacaspis pentagona*) ;
The Gipsy Moth (*Porthetria dispar*) ;
Potato Canker (*Chrysophlyctis endobiotica*) ;
Parasitic diseases affecting potatoes externally or internally ;
Branch or Stem Canker (*Nectria ditissima*) ;
Gooseberry Mildew (*Sphaerotheca mors-uvae*) ;
White Pine Blister Rust (*Peridermium Strobi*).

13. — The importation into Canada of potatoes from Newfoundland or the Islands of St. Pierre or Miquelon is prohibited.

14. — The Minister may on special application to that effect, authorise the importation into Canada of any insect, pest or disease herein specified, but only for scientific purposes.

15. — The Regulations enacted under the « San José Scale » Act are repealed.

3091 **Text of the Injurious Insects, Pests and Plants Diseases Act of the Province of Nova Scotia, Canada.** — Passed in 1911.

Act to prevent the introduction and propagation of insects, pests and diseases of plants.

Canada: Nova Scotia

It shall be enforced by the Governor, the Council and the Assembly as follows :

1) Abbreviated title. — This Act may be cited as the « Injurious Insects, Pests and Plants Diseases Act, 1911 ».

2) Definitions. — In this Act and each of the Regulations completing it, except where otherwise directed by the text, « Vegetation » signifies any tree, shrub, plant or fruit, or any part of a tree, shrub, vine or plant. « Inspector » shall mean an inspector or other officer appointed under the provisions of this Act for the execution of this Act.

3) Object of the Act. — This Act shall be applied only to the plant diseases, insects and pests which the Government may from time to time declare injurious to vegetation and subject to this Act.

4) Regulations. — The Governor in Council may from time to time make such regulations as are considered expedient for pre-

venting the introduction into the province of Nova Scotia, or the propagation in that province, of such diseases of plants, insects or pests.

5) These Regulations may provide :

a) That, except where otherwise provided in these Regulations, it shall not be lawful for any person to possess in the province, or in any region of that province, at any time or during any time, any plant or other substance deemed by the Governor in Council to be likely to introduce into the province or propagate therein, plant diseases, insects or pests.

b) The terms and conditions under which such plants or other substances may be legally possessed.

c) The treatment or method of treatment to be applied to any vegetation, vegetable substance, or establishment, in order to extirpate or check or prevent the propagation of such diseases of plants, insects or pests; and these Regulations may direct whether such treatment shall be carried out by the owner or by anyone appointed for that purpose.

d) The treatment of any vegetation or vegetable substance infected with any plant disease, insect or pest, prior to their sale or disposal.

e) That the proprietor of the establishment where such diseases of plants, insects and pests have been discovered shall immediately give notice thereof to the Secretary of Agriculture, and shall also forward specimens of such diseases, insects or pests to the said Secretary.

f) For the seizure or confiscation of any vegetable substance, or its recipient (if any), in regard to which an offence against the Act or one of its supplementary Regulations has been committed.

g) Generally, in respect to the observance or non-observance of any act or deed whatsoever, which may be deemed by the Governor in Council desirable for the execution of this Act, whether such Regulations are of the kind mentioned in this Article or not.

6) Appointment of Inspectors and other officers. — The provincial Secretary may appoint such inspectors and other officers as he thinks fit for the execution of this Act and the supplementary Regulations. Such inspectors and other officers shall act under the direction of the Secretary of Agriculture.

7) Power of Inspectors. — Every inspector shall have the right to enter any place or establishment, where he suspects the existence of any plant disease, insect or pest.

8) Fines for offences under this Act and its supplementary Regulations. — Any person offending against any provision of this Act or its supplementary Regulations, or neglecting to execute them, or impeding their execution in any way, shall be liable, after summary trial, to a fine of twenty to one hundred dollars, with costs; in default of payment, to imprisonment from ten to thirty days.

9) Orders and Regulations to be published. — Every Order in Council and Regulation made to complete this Act shall be published in two successive editions of the « Royal Gazette »; but every additional Order in Council and Regulation shall come into force on and from the date on which such publications have been made.

10) Repeal of Rev. Stat. 1. 63 and 64. — The « Black Knot Act », chapter 63 of the Revised Statutes of Nova Scotia 1900, and the « San José Act », chapter 64 of the Revised Statutes of Nova Scotia 1900, are repealed.

3092 Canada **Legislation for Seed Control in Canada. Destruction of Weeds.** — See above, Abstr. 2536.

3093 **Importation of Cotton Seed in Kamerun** — *The Board of Trade Journal.* No 770, p. 407. London, Aug, 15, 1911.

Kamerun

An Ordinance of the Governor of Kamerun, provides that cotton seed may only be imported into the Protectorate by permission of the Governor, which will be accorded in cases where, on examination of the seed, it appears that it does not contain noxious animal or vegetable parasites. Seed which does not satisfy this condition will be destroyed. Seed may be imported only through the port of Victoria, and the examination will be carried out by the *Versuchsanstalt für Landeskultur* at that port.

INTERNATIONAL INSTITUTE OF AGRICULTURE

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THE INTERNATIONAL INSTITUTE OF AGRICULTURE

The International Institute of Agriculture was established under the International Treaty of June 7th, 1905, which was ratified by 40 Governments. Ten other Governments have since adhered to the Institute.

It is a Government Institution in which each Country is represented by delegates. The Institute is composed of a General Assembly and a Permanent Committee.

The Institute, confining its operations within an international sphere, shall:

a) Collect, study, and publish as promptly as possible statistical, technical, or economic information concerning farming, vegetable and animal products, the commerce in agricultural products, and the prices prevailing in the various markets;

b) Communicate to parties interested, also as promptly as possible, the above information;

c) Indicate the wages paid for farm work;

d) Make known the new diseases of vegetables which may appear in any part of the world, showing the territories infected, the progress of the diseases, and, if possible, the remedies which are effective;

e) Study questions concerning agricultural co-operation, insurance, and credit in all their aspects; collect and publish information which might be useful in the various countries for the organisation of works connected wrth agricultural co-operation, insurance and credit;

f) Submit to the approval of the Governments, if there is occasion for it, measures for the protection of the common interests of farmers and for the improvement of their conditions, after having utilized all the necessary sources of information, such as the wishes expressed by international or other agricultural congresses or by congresses of sciences applied to agriculture, or agricultural societies, academies, learned bodies, etc.

The Institute publishes: *a*) a Bulletin of Agricultural Statistics; *b*) a Bulletin of Agricultural Intelligence and Diseases of

Plants; *c*) a Bulletin of Economic and Social Intelligence; *d*) a Bulletin Bibliographique hebdomadaire (published every Saturday).

It has also published a volume on " The Organization of Agricultural Statistical Services in the Several Countries ", and a volume on " Statistics of Cultivated Areas and of Vegetable and Animal Production in the Adhering Countries " (an Inventory drawn up from documents published by Governments), and " Monographs on Agricultural Association in Various Countries (2. Vol) ".

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General Secretary: Prof. PASQUALE JANNACCONE.

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3	**Austria**	I	Chev. V. DE POZZI, Government Councillor.
4	**Hungary**	I	E. DE MIKLÓS DE MIKLÓSVÁR, Secretary of State for Agriculture. Member of the House of Magnates.
5	**Belgium**	IV	O. BOLLE.
6	**Brazil**	I	ANTONINO FIALHO, Ex-Deputy; Ex-President of the National Agricultural Society.
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9	**China**	I	His Excell. OU-TSONG-LIEN, Minister plenipotentiary of China to H. M. te King of Italy.
10	**Costa-Rica** . . .	V	R. MONTEALEGRE, Minister plenipotentiary of Costa-Rica to H. M. the King of Italy.
11	**Cuba**	V	C. M. DE CESPEDES Y QUESADA, Minister plenipotentiary of Cuba to H. M. the King of Italy.

	States adhering to the Institute	Groups in which the adhering States are classified	Names and Rank of the Delegates
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21	**Tunis**.	V	LOUIS-DOP, Delegate of France.
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24	**Canada**	II	H. G. DERING, Delegate of Great Britain and Ireland.
25	**British India** .	II	Sir EDWARD BUCK, K. C. S. I.
26	**New Zealand** .	IV	H. G. DERING, Delegate of Great Britain and Ireland.
27	**Mauritius** . .	V	H. G. DERING, Delegate of Great Britain and Ireland.
28	**Union of South Africa**	IV	. . . . .
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	States adhering to the Institute	Groups in which the adhering States are classified	Names and Rank of the Delegates
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37	**Norway**.	IV	Dr. G. FJELSTAD, Agricultural proprietor.
38	**Paraguay**	V	. . . . .
39	**Holland**	IV	H. DE WEEDE, Minister plenipotentiary of Holland to H. M. the King of Italy.
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The Canadian abstracting is by Mr. J. K. Doherty, the able chief of the Canadian Bureau of Correspondence with the International Institute of Agriculture.

AGRICULTURAL INTELLIGENCE

NB. The Intelligence contained in the present Bulletin has been taken exclusively from the books, periodicals, bulletins, and other publications which have reached the Library of the International Institute of Agriculture in Rome during the month of November-December 1911.

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The Editor's notes are marked (Ed.).

Development of Agriculture in Different Countries — Scientific Institutions — Education in Agriculture and Forestry — Experimentation — History of Agriculture.

Information on Agriculture in Hungary. — (Communicated by M. de Miklós de Miklosvár, Delegate of Hungary to the International Institute of Agriculture). 3094

1. *Dry Farming in Hungary* (1).

Towards the end of the spring of 1911, the Secretary of State M. Ed. Miklós de Miklosvár suggested to the Minister of Agriculture the idea of making dry-farming experiments in the four State agricultural establishments. The Minister, recognizing the great importance of such experiments, has arranged for them to be carried out in the four properties of the State, under the supervision of M. Sáfory, an agriculturist who has just spent three years in America studying the dry-farming question. Hungary

2. *Importation of Breeding-Stock from England.*

The Hungarian Farmers' Co-operative Society, assisted by the Minister of Agriculture, imported a large number of breeding animals from England in September.

In the first place come Shorthorn cattle, bred solely for milk. The cows of this breed give 3 000 to 5 000 litres (660 to 1 100 gallons) per annum; some give up to 26 or 30 litres (5.7 to 6.6 galls.) daily. Their great feature is complete immunity from tuberculosis. The herd imported numbers 422 cows, 15 bulls, and 122 calves.

(1) See this *Bullelin*, Dec. 1910, p. 234; Abstracts 82. 85, 86, and 87. Jan. 1911; Abstr 423, Feb. 1911; Abstrs. 782 to 786, March 1911; Abstrs, 1396 and 1397, May 1911; Abstrs. 1705 and 1706, June 1911. (*Ed.*).

Some pigs were also brought over, namely 5 young Yorkshire sows, and 7 young boars and 29 young sows of the Lincolnshire breed.

Some of these animals were imported for individuals, others for the Society; these latter were sold at a price including cost-price, freight, duties, and insurance, plus 3 % for the Society.

The Minister of Agriculture allowed a subsidy of 50 crowns (about £ 2) on each animal imported.

3. *Results with Rye on the Farm of Satoskô.*

Some experiments carried out at the farm of the Co-operative Society on the use of chemical manures have given interesting results.

In the autumn of 1910, 30 arpents cadastraux (about 43 acres) of this farm were sown down to rye. The soil was worn-out, of a yellow colour, and largely composed of loose sand; it had received no dung for several decades, and never any chemicals.

For these experiments the field was divided into three plots, of which one was left unmanured as control, one received 2 quintals of " potassic superphosphate " per arpent (2 $^3/_4$ cwts. per acre), and the remaining one the same amount of " potassic superphosphate ", with 1 $^3/_8$ cwt. per acre of nitrate, half in autumn and half in spring.

The whole field was cultivated as follows: disked; a month later ploughed, immediately after furrow-pressed and harrowed; then drilled and harrowed.

On the unmanured plot there were 3 stooks to the arpent, giving 1.2 qls. of grain (1.65 cwt. per acre). The " superphosphate of potash " plot gave 12 stooks per arpent, with 5.32 quintals of grain (7.3 cwts. per acre). The complete plot gave 16 stooks per arpent, with 12.3 quintals of grain (16.9 cwts per acre), or an increase of 11 quintals per arpent (15.2 cwts. per acre) over the unmanured.

The following conclusions may be drawn:

1) The manures had more influence on the crop than the cultivation, as the soil contains a minimum quantity of plant food.

2) The increase on the phosphate and potash plot shows that the crop had not been able to make use of all the phosphates supplied, owing to lack of nitrogen.

3) The third plot, with complete manures, shows this even better.

The manure on the third plot cost 50 crowns per arpent (about 29 s. per acre), but the value of the extra crop, at 16 kr. per ql.;

comes to 177.60 crowns, leaving a balance of 127.60 crowns above the cost of the manure.

It seems at first a rather expensive manuring for a soil which has previously yielded next to nothing, but it is the only way of getting an immediate profit from such soils. Results could no doubt be obtained by green manuring, but only after several years, while Chile salpetre gives immediate results.

4. *Hop-growing in Hungary.*

According to written accounts hop-growing has only been carried on to any extent in Hungary in the last 120 to 150 years. Up to 1885 even, there were only about 260 arpents (nearly 360 acres) under hops, and the price varied between 100 and 300 crowns.

In 1900 the area reached 626 arpents (875 acres), yielding 2 000 to 3 000 quintals (4 000 to 6 000 cwt.); but this yield was not large, considering that, for instance, in 1897 the exportation was only 2 350 qls. against 5 200 imported.

In 1907 the area was 1 772 arpents, with an exportation of 12 800 qls. and importation of 7 264 qls.

The yields for the last four years were:

	per arpent.	per acre	total quintals	cwt.
1907	503 kg.	7.0 cwt.	9 785	19 260
1908	433 »	5.9 »	9 095	17 900
1909	526 »	2.3 »	8 485	16 700
1910	516 »	7.2 »	8 652	17 060

The Hungarian exportation of hops is fixed; the price, which reaches 800 crowns the quintal (£ 16 the cwt.), shows that the quality has greatly improved; this price is only 100 or 120 crowns (£ 2 to £ 2.8 *s.* per cwt.) lower than that of the famous hops of Saar in Bohemia.

Fifteen or twenty years ago such a state of affairs would have been thought impossible; but now the export trade is steadily developing, and business with Germany and even England seems to be on a sure footing.

5. *Results at the Dairy-Farm of the Agricultural School at Magyaróvár: Improvement in the Milk Yield.*

At the dairy-farm of Magyaróvár, which covers 450 arpents (640 acres), it was proposed 16 years ago to eliminate the poor milkers and select the good ones, with a view to increasing the milk yield, at the same time keeping the true external characters

of the Simmenthal breed. In these 16 years the milk-yield has been increased by 990.4 kg, (2 181 lbs.) per cow, namely from 2 353.4 (5 182 lbs.) to 3 343.8 kg. (7 363 lbs.). At the market price at Magyarovár, this means an increase of 198 crowns (£ 8.5 s.) per head per annum. As the herd has averaged 50 during the last three years, the extra yield has brought in 9 904 crowns (£412.13 s.) per annum more than 16 years ago.

At the same time the percentage of butter-fat has shown no falling-off with the increased milk yield.

3095 FONTENAY. **The Agricultural Conditions of Hungary in 1911** (1) (Situation agricole de la Hongrie en 1911). — *Rapports Commerciaux des Agents Diplomatiqnes et Consulaires de France*, No. 955, pp. 1-30. Paris, 1911.

Hungary possesses great natural advantages in its unusual variety of climates and soils. In the centre are vast plains where the deep vegetable soil gives exceptional fertility; further, the rivers, **Hungary** besides forming natural ways of communication, are the means of bringing considerable fertility to the land; this might be further increased by a thorongh system of irrigation.

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(1) According to the « *Statistiques des Superficies cultivées, de la Production végétale et du Bétail dans les Pays adhérents* » published by the Internat. Inst. of Agric., 1910, the land in Hungary in 1908 was occupied as follows: Total area 32,494,408 hectares (about 80,295,000 acres); under arable cultivation, 14,012,801 ha. (about 34,626,200 ac.); vineyards, 235,121 ha. (484,994 ac.); woods and forests, 9,026,117 ha. (about 22,308,700 ac.); meadow, 3,337,197 ha. (about 8,224,000 ac.); pasture, 4,085,046 ha. (about 10,094,300 ac.); non-agricultural, 1,798,126 ha.

In the 1908 survey the crops were as follows (1000 hectares = 2 471 04 acres; 1000 quintals = 98.4206 tons).

Crop.	Area (ha.)	Yield (qls.)
Wheat	3,885,305	45,021,468
Spelt Wheat	6,734	30,813
Rye	1,126,673	12,117,831
Rye and Wheat	98,775	1,117,198
Barley	1,155,436	12,818,737
Oats	1,179,034	10,802,272
Millet	41,586	315,611
Buckwheat	7,159	48,351
Peas	13,383	133,730

Round this plain stretches a vast ring of mountains covered with ancient forests, little worked at present owing to lack of roads and railways; the mineral wealth in their sides is also little worked, and in fact not fully known. Indeed Hungary possesses all the conditions making for economic strength in a country.

Crop.	Area (ha.)	Yield. (qls.)
Beans	26,784	200,091
Lentils	7,015	48,805
Maize	2,784,705	42,267,927
Melons	26,490	3,470,190
Pumpkins	11,902	2,548,065
Potatoes	662,580	43,707,611
Sugar Beets	106,070	20,907,304
Mangolds	199,723	48,210,172
Sorghum	2,357	82,224
Rape	19,771	145,238
Hops	1,142	8,675
Tobacco	49,303	751.323
Hemp seed	65,153	201,984
Hemp fibre		527,156
Flax seed	18,620	55,864
Flax fibre		130,756
Poppy	6,403	40,148
Vetches for seed	49,405	415,021
Clover seed	53,535	88,891
Lucerne seed	14,111	35,549
Sainfoin seed	3,205	13,148
Moka seed	4,343	25,825
Green Maize	91,422	18,175,331
Winter Vetches, Peas and Rye	26,184	654,972
Spring Vetches and mixed Corn	394,719	10,386,064
Clover	353,777	10,571,038
Lucerne	187,268	7,593,492
Sainfoin	25,839	561,837
Moka	38,982	959,258
Cabbages	52,107	8,445,724
Other crops	53,063	

Total area under crops, 12,855,013 ha, (about 31,765,400 acres); fallows, 1,262,205 ha. (about 3,116,960 ac.).

Live stock (end of April, 1909) : Cattle, 7,152,568; Horses, 2,173,649; Sheep, 7,904,634 ; Pigs, 5,489,946 ; Goats; 308,997; Donkeys and Mules (1908), 29,172. Bee-hives (1908), 669,865. (*Ed.*).

Naturally, with land so rich, and so well cultivated, the people obtain much beyond their own requirements.

Up to 1870, the industrial class made up only 5 % of the population, but at present it is quite 25 %.

Agriculture, however, still takes the leading place in Hungary; the industrial production is not enough to compensate for the losses on a bad harvest.

The yields for the last five years of the six principal crops (in thousands of tons) are given in the following table:

	1910	1909	1908	1907	1906
Wheat	4852	3036	4134	3169	5285
Rye	1368	1177	1033	1403	1352
Barley	1195	1539	1250	1329	1496
Oats	1067	1318	1663	1181	1260
Maize	5334	4046	3897	4360	4035
Potatoes	4740	4916	3583	4468	5056

The year 1910 gave good average yields as regards quantity and was not behind other years as regards prices and demand.

The vintage, however, was by no means as abundant as those of previons years. In 1908 it was 6,510,000 hectolitres (143 million gallons, Imperial); in 1909 it was 3,280,000 hl. (72 million gal.) while in 1909 it fell to 2,300,000 hl. (nearly 51 million gal.), the lowest for ten years, and all the more unsatisfactory because there are at present 60,000 hectares (nearly 150,000 acres) more vines grown than in 1905.

During the past year the subject of live-stock has been much under the consideration of Hungarian statesmen. Owing to the excessive rise in the price of meat, enquiries have been pushed further, but without amy definite solution being found for the difficulty. The clashing of interests between the industrial and agricultural populations postponed the opening of the Roumanian and Servian frontiers to cattle from across the Danube; and the same rivalry made itself felt when the introduction of South-American meat was suggested. The feeders declare that the prices paid them have not increased to anything like the extent complained of in the industrial centres; the butchers make out that they gain next to nothing on the present sale-prices; it is therefore concluded that the crisis is largely due to the number of middlemen whom the consumers have to put up with.

The Royal Hungarian Museum of Commerce has published some very interesting statistics and articles. Among the latter is one dealing entirely with the packing of goods for export; all the informa-

tion on the subject will be found collected there, and in particular the experience of some of the large exporting firms of Hamburg and Leipzig.

At Budapest there is an institution which merits special mention, *viz*, the Museum of Agriculture. This institution, unique of its kind, was inaugurated four years ago.

LABI (Belgian Consul at Tripoli). **Agriculture in Tripoli**. — *Recueil consulaire*, Tome 151, 3e Livraison. Pp. 364-376. Bruxelles, 1910. 3096

The chief agricultural products of Tripoli are barley, wheat, henna, oranges, lemons, olives, dates and vegetables in general. Artificial irrigation is employed in the gardens, and is carried out by means of a very primitive Arab system. Tripoli

The cereal harvest during 1909 amounted to 2 624 tons of barley and 219 tons of wheat.

It is estimated that, owing to scarcity of labour and of capital, only a very small part of Tripoli is cultivated.

Vines are little grown, because the Arabs dislike planting fresh stocks, with the result, that only very small quantities of wine are made, and the grapes which are gathered are consumed in the country.

The olive would grow very well throughout Tripoli and would yield a good crop if well cultivated. This is proved by the fact that 60 years ago, French firms established in the country, used to send to Marseille, in years of good harvest, many cargoes of oil. Now, however, since the population has increased, while the olive cultivation has remained stationary, the yield of oil, even in good years, does not suffice for local consumption.

Although the olive trees receive no attention in Tripoli, they are very fine ; if they were given proper care, this country would in a few years have a considerable output of oil so as to be a serious rival of Tunis in this respect.

In the gardens, almond-trees, carobs, figs, apricots, apples, pears, peaches and oranges are cultivated. The latter have suffered greatly from the attacks of a small worm. Nothing has hitherto been done to control this pest. In 1910, oranges were exported to Germany.

The soil, as a rule, is suitable for the cultivation of large quantities of early vegetables which could be exported. Tripoli is denuded of forests. Alfa is a product which is exported in varying quantities, according to the greater or less demand for it in England.

In 1909, the amount exported was worth 1 419 970 fr. (£56 762) Live-stock breeding is carried on in a very primitive manner, but

is of some importance, as cattle and some horses are exported to Malta, and sheep to Egypt.

This industry might be a great source of revenue to the country, were it not for the fact that cattle are not sufficiently sheltered in winter.There is great mortality among the animals; in 1909, 300 000 head were lost; lambs, goats and cattle.

For some years, poultry raising has been carried on, a large number of fowls being sent to Malta. The eggs are exported to Tunis, France, Italy and Algeria. The annual export amounts to about 480 203 fr. (£19 208).

The total export of skins, wool, etc. is valued at 263 333 fr. (about £ 10 533).

3097 ZECH. **Agriculture in Liberia.** — *Deutsche Kolonialzeitung*, No. 41, pp. 687-688. Berlin, 14. Oktober 1911.

Liberia

The principal products exported from Liberia are piassava, palm-seed, palm-oil, and coffee; in 1908 these products brought in 707 000 dollars.

This production is, however, nothing to what it might be, considering the richness of the soil and the luxuriance of the vegetation.

The population is composed of natives and of Liberian negroes who have come from America.

The bad organization of land-tenure gives no security to the indigenous negroes for agricultural work; and the Liberians do not go in for agricultural work, but are traders and speculators.

The attempt to attract negro agriculturists from America has been unsuccessful.

The rich products of the natural forests of the interior are not sufficiently exploited owing to lack of roads, which are only just beginning to be built.

3098 H. G. MACKIE, Consul. **Report on the Trade and Resources of the Congo** (1). — *Diplomatic and Consular Reports.* Congo, No. 4780 Annual Series, pp. 7-10. London, September, 1911.

Belgian Congo

Agriculture. — Some advance was made in 1910 in agriculture by the creation of Government experimental stations in the districts of the Kwango, Kasai, Equator, Bangala and the Katanga, Twelve

(1) Cp. Abstr. 719 *Bull.* March 1911; Abstr. 2049 *Bull.* July 1911; Abstr. 2419, 2420 and 2631 *Bull.* August-September-October 1911. The chief products of Belgian Congo are rubber, ivory, palm-nuts, palm-oil, and white

large rubber plantations were either newly created or developed in that year. A special study is being made of the agricultural resources of the Katanga, where several experimental stations have been started contiguous to the railways in construction or contemplation. In this district attention is likewise being devoted to meteorological observations, analysis of the soil, pastures and cattle rearing, with a view to the organisation of food producing stations, which it is considered will have an important bearing upon the difficult question of food-supplies in the mining districts, where provisions are expensive and scarce.

To insure greater efficiency in the employment of experts for promoting agriculture, the country has been divided into agricultural circuits, which at present number six in all. The first comprises the Lower Congo, Middle Congo, Kwango and Lake Leopold II; the second the districts of the Equator, Ubangi and Bangala, in which the larger plantations of rubber occur; the third the Uelle district, and more particularly the cattle-rearing zones of Gurba-Dungu, Bomokandi und Uere-Bili; the fourth the districts of Stanleyville and the Aruwimi, which will embrace the cattle-rearing zones of the great Lakes; the fifth the Kasai, and the sixth the Katanga.

Each circuit is under the direction of a district agriculturist, aided by a staff of efficient assistants, and subject to the general superintendence of the Director of Agriculture at Boma and of the Assistant Director in the Katanga.

Scientific missions are to be sent to Malaysia and British India for studying tropical agriculture, irrigation and the prevention of diseases in plants. Until it becomes possible to obtain experts versed in rural economics in Belgium itself, the staff will be drawn from other countries.

The meteorological section will be well provided with instruments which will also be distributed among the various religious missions, and the work in this important branch will thus receive considerable impetus.

Experimental gardens analogous to those at Eala, in the Equator district, will be created in the Lower Congo, Kasai and the

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copal. Coffee grows freely, and the cultivation of cocoa is successful. Tobacco is grown in all native villages. Plantations of rubber and coffee have been established by the government. The chief agricultural exports during 1909 were as follows: Rubber 42 569 470 francs; ivory, 6 583 221 frs.; palm-nuts, 1 835 209 frs; palm-oil, 984 332 frs; white copal, 867 863 frs; cocoa, 969 435 frs.; coffee, 16 562 frs. (Cp. *The Statesman's Yearbook for 1911* p. 650. London, 1911). (*Ed.*).

Katanga. The gardens at Eala are credited with having done some important work, but being situated on the Equator, the results of experiments made in the culture and acclimatisation of plants are inapplicable to localities far removed from this district in which the rains are not so constant or the climate so equable.

The agricultural research laboratory, under the direction of two experienced chemists at Eala, is to be placed at the disposal of settlers.

Cultivated rubber. — The experimental cultivation of *Hevea brasiliensis*, *Funtumia elastica* and *Manihot glaziovii* species is being continued on a much enlarged scale on the plantations already in existence, and extensive new areas are about to be brought under cultivation. A number of the larger plantations, equipped with mechanical appliances for coagulating the latex, are being devoted to the exclusive cultivation of *Hevea brasiliensis*, while many of the smaller plantations, entailing useless outlay in their upkeep, have been abandoned. Provision was made in the Congo budget for the planting of 2 000 hectares, but owing to the insufficiency of seed of *Hevea brasiliensis*, only about half that area has been planted. These plantations occur at Musa, Likimi, Dundusana, Mobwasa and Yambata in the Bangala district, Waka and Wenna in the Equator district, Yambuya and Avakubi in the Stanleyville district, and Bokala in the Middle Congo.

The *Funtumia elastica* or " Ire " species of rubber is the most common on the Congo, and numbers some 3 461 000 trees, of which the greater part are reported to be thriving satisfactorily. The older trees of seven to nine years that have been tapped have yielded a rubber of good quality, that commanded a price in the Antwerp market ranging between 17 and 20 fr. per kilo. The present yield of the six-year old trees is said to be 100 grammes, which would represent a return of 62 ½ kilos per hectare, from 625 trees.

The *Hevea brasiliensis*, first introduced into the Congo by private initiative, is now being adopted by the Government as a most promising plant, adaptable to the climatic conditions and inferiority of soil; and maturing rapidly. The Government has now planted 30 000 trees of this species, and has ordered seven extensive areas in the Bangala and Equator districts to be brought under cultivation. A commission has been appointed to explore these districts with this end in view. All the available seeds in the Congo having been used up, further quantities are now being imported from Ceylon.

Interspersed with *Funtumia elastica*, 17 000 trees of *Hevea brasiliensis* have been in existence for some time on the plantation of Ganda-Sundi in the Mayumbe district. These trees will soon

mature and afford information of a definite character on the subject of Hevea rubber in the Lower Congo.

In view of the higher prices commanded by the *Manihot Glaziovii* species of rubber, and the advantages that are claimed for this tree over *Funtumia elastica*, the Government has decided to give considerable impetus to its cultivation. This rubber, experimentally produced in the Congo, has fetched 23 fr. per kilo, in Antwerp, on account of its excellent quality. Up to the present, experiments in *Manihot glaziovii* have been conducted at some twenty Governments posts, the plants numbering about 185 200. The results are considered to be encouraging.

Experiments are also in progress with other species of rubber such as *Castilloa*, various *Manihot* and *Ficus*, as well as a latex-yielding Euphorbia introduced from Central America. Attention will also be given to the old rubber lianas, of which some 11 000 000 are known to exist. It is believed that these lianas will yield an appreciable quantity of rubber in the space of a few years, but that the upkeep of plantations of less than 50 000 lianas will not pay, and must therefore be abandoned.

As soon as the tapping of the trees becomes practicable, it is proposed to conduct the industry on scientific lines, such as those obtaining in Malaya, particular attention being paid to the process of coagulation, washing and drying, for which the most approved plant will be acquired. The smoke-drying system in vogue in Brazil is likewise being considered, with a view to its adoption in the Congo.

Great number of trees are uprooted by the winds, apparently on account of some deficiency in the soil that stunts the subsoil development of the tree. Other trees are perishing owing to the ravages of an insect known as the " borer " (1), while *Funtumia elastica* does not appear to yield much latex after the first tapping. These signs, coupled with the fact that though this industry is 10 or more years old, there have been no exports of cultivated rubber beyond a few trial shipments, seem somewhat discouraging. Hopes are now, however, being centred upon *Manihot glaziovii*, which yields an excellent rubber, but this plant, too, has not yet emerged from an experimental stage of development.

(1) The " Castilloa borer " damaging Rubber Trees in Uganda is *Inesida leprosa* (Cp. C. C. GOWDEY *Report of the Government Entomologist for the Year 1909-1910.* Uganda Protectorate).

(*Ed.*).

Wild rubber. — Among the numerous latex-yielding plants to be found in the vast forest lands of the Congo, the most common are :

Landolphia owariensis, which is perhaps the best known liana, is spread throughout the rubber areas of the country. It is a vigorous liana, attaining a height of some 350 feet, and the result of a test shows that a liana of this species, having a circumference of 18 inches at a height of 3 feet above the ground, produced 31.7 oz. the first tapping, and 1.655 oz. the second, thus showing an annual yield of 33.35 ozs. This plant produces a rubber known as Congo " thimbles ", and is latex yielding up to a circumference of 3 ¼ inches. Lianas of a thicker circumference do not yield.

Landolphia klainii and *Clitandra Arnoldiana* are widely scattered throughout the Lower and Middle Congo, the Kasai, Kwango and the Ubangi. The former produces an excellent black rubber by immersing the latex in boiling water, and experiments with the latter have yielded good results.

Carpodinus gracilis, of which the rhizomes yield a good quality rubber.

Landolphia Droogmansiana, which attains a great height and considerable thickness, and is best known in the Mayumbe, where it is worked.

Landolphia Tollonii, which is best known in the Kasai and grows in a sandy soil. It is remarkable for the extraordinary development of its roots, which penetrate into the soil to a depth of 1 ½ to over 3 yards. The rhizomes measure $^3/_5$ of an inch in diameter, and are interwoven in large meshlike clusters below the surface.

Carpodinus gentilli is a liana that attains some 270 feet in height and circumference of 12 inches. It is best known in the Bangala, Uelle and other districts to the north of the Equator.

Wild rubber, in districts in which it has been worked on an extensive scale, is now becoming scarce in places, owing to the ruthless destruction of the vines in the forests bordering on the rivers. Many of the large rubber zones have been worked out completely, and the industry is at a standstill until the forests have had time to recover. Little is known about the ages of the vines worked by the natives in the past, the only observations available being those of recent years. Some of the plants, such as *Landolphia Klainii* and *Clitandra Arnoldiana*, are known to have attained a growth of 50 feet in height and 4 to 5 inches in circumference in four years, but expert opinion differs too widely to admit of any estimation of the period of growth of wild rubber, which, it is supposed, may be anything between 15 and 50 years. There are, of

course; still vast areas of virgin rubber forest, but these are at remote distances from the present lines of communication, and are consequently difficult of access and unprofitable, owing to the lack of means of transport. In some of the remaining accessible districts, where rubber is still plentiful, labour difficulties have interfered with the progress of the industry. The cultivation of rubber in other countries is now being conducted on such advanced lines as to threaten, in course of time, to displace the inferior wild product in the market. But even if the demand for wild rubber does not fail, there are seemingly no prospects of any immediate revival of native industry of this country, now that forced labour is being abolished.

RUBBER

Year	Congo Produce		Including Transit Trade	
	Metric tons.	Pounds Sterling	Metric tons.	Pounds Sterling
1899	2 747	1 124 036	3 863	1 158 940
1900	5 317	1 594 960	5 475	1 642 586
1901	6 023	1 758 638	6 189	1 807 326
1902	5 350	1 669 341	5 804	1 810 857
1903	5 918	1 893 754	6 595	2 110 337
1904	4 831	1 739 138	5 765	2 075 271
1905	4 862	1 750 236	6 108	2 199 031
1906	4 849	1 939 572	6 310	2 523 874
1907	4 657	1 759 309	6 070	2 293 199
1908	4 560	1 230 820	5 947	1 605 750
1909	3 751	1 702 779	5 301	2 406 837

Why has Pellagra only recently appeared in the United States of America? — *The Journal of Tropical Medicine and Hygiene.* Vol. XIV, No. 19, p. 294. London, October 2. 1911. 3099

In an article published by the *New York Medical Journal* of January 22, Prof. Howard S. Reid reviewed the literature as to the possible part played by a fungus or fungi in the deterioration of maize. The fungi described by French and Italian writers as affecting maize are : *Aspergillus fumigatus, A. flavus, A. flavescens* and *Penicillium glaucum.* Dr. Wood. United States, reports having found *Penicillium, Aspergillus, Syncephalastrum, Mucor* and *Chaetomium* in United States maize; but these fungi have been known in America for a long time, and mouldy corn has been used by the poorer classes in the Southern States for generations. Reid refers to an altered condition in the manner of harvesting grain. Until recent years the practice of « topping » the corn stalks was followed. United States

« Topping » meant that for fodder purposes the green leaves above the corn ears were removed, and the ears allowed to ripen on the stalk and to become perfectly dry before gathering them. This was found to be a profitless practice as far as fodder is concerned, and in recent years farmers cut the entire stalk and allow the corn to mature in shocks. This permits the ground to be sown with fall corn, which, when it springs up, does not mature and harden under these conditions, and when stored does not keep well.

This cannot, however, be said to account for the rather sudden appearance and rapid spread of pellagra in the States; and Reid is inclined to attribute the appearance to some maize-infecting organism producing toxic substances in the maize kernel. He finds that *Diplodia zeae*, which causes an ear rot of maize, prevails in pellagra districts. This fungus was believed to exist in Carolina as long ago as 1822, but in the 1878-1900 reports *Diplodia* is not mentioned. Of late years, however, the presence of *Diplodia* has shown itself as causing « dry rot » disease in corn stalk to such an extent as to attract the attention of agricultural authorities, and this at a time when pellagra has appeared to rather an alarming extent. These two phaenomena have been regarded as cause and effect; but as yet this cannot be inferred scientifically.

The maize upon which *Diplodia* has grown is altered both in physical and chemical composition. Meal infected with *Diplodia* was found toxic to mice.

The isolation of alcohol soluble proteins from *Diplodia* meal yelds compounds differing from the bodies isolated by the same means from sterile meal. The products obtained from *Diplodia* meal appear to resemble in every way the pellagrozein isolated and described by Lombroso.

3100 **The Colonial Institute at Hamburg** (1). (Hamburgisches Kolonialinstitut). — *Deutsches Kolonialblatt*, Nr. 20, pp. 768-769. Berlin, 15 Oktober 1911.

Germany The Colonial Institute at Hamburg offers commercial men the means of acquainting themselves with the conditions of lands across the sea, as regards commerce, colonial affairs, and general and special colonial geography. Modern European, African and Eastern languages are taught there. For agriculturists, the Institute offers

(1) Cf. this *Bulletin*, Dec. 1910, p. 203.

a course of studies including general linguistic and politico-economic knowledge, and courses of agriculture, science, and veterinary science from the colonial standpoint. There are also special courses on the cultivation of such crops as tea, coffee, cocoa, tobacco, cocoanut, cotton; also on stock raising.

There are further special courses for colonial officials and for doctors practising in tropical countries.

The Development of Country Travelling House-keeping Schools. 3101
Die Entwicklung der ländlichen Wanderhaushaltungsschulen. (*Zeitschrift für das ländliche Fortbildungsschulwesen in Preussen*). — Heft 1 Berlin Oktober 1911.

In Prussia, country travelling housekeeping schools are developing in a satisfactory manner.

It is especially wished that opportunities may by afforded to the daughters of the smaller and larger farmers and tradesmen in the country to obtain, at a moderate cost, such instruction as may be useful for them in country housekeeping. Hitherto, young girls who were unable to attend a long course at a house-keeping school, were obliged to obtain the necessary instruction by means of private courses in a town, while, sewing and ironing could only be learnt from professionals. Germany

As in the cooking courses in towns the requirements necessary for the country, viz. simplicity and the necessity of making use of home supplies were not sufficiently considered, it was thought desirable to found special schools for the instruction of young women in the country in housewifely knowledge.

In order to minimize the expenditure as far as possible, the schools are not to be established in any particular place, but are to be travelling schools. Only by this means is it possible that the largest number of young girls can profit by the advantages. In 1894, two such schools were started in Prussia, in 1909 there were 44.

Since however in Feb. 1911 a grant was made from the state funds by the Minister of Agriculture for the foundation and maintenance of travelling house-keeping schools, there are already over 100 of such schools (some of which are in process of being established) which are applying for state assistance.

This shows how much the necessity for these schools is recognized. The establishment of the schools is partly the work of Women's Associations, partly that of parochial societies.

At present, there is a dearth of female teachers who can give instruction in all the subjects.

Very often their labours are supplemented by male instructors and other assistants.

In time, there will be a sufficient number of women teachers, and it is hoped that a uniform curriculum will be drawn up. Each course is limited to 8 weeks.

It is intended that instruction shall be given, not only in the different departments of house-keeping, but also in gardening and the breeding of small domestic animals.

3102 WALTER C. MURRAY. **The College of Agriculture of the University of Saskatchewan**. — *President's Report*, 1909-1910. Saskatoon.

The only departments of the College of Agriculture in operation prior to June 30th 1910 were those of Agronomy, Extension Work and the College Farm. The Extension Department was transferred from the Department of Agriculture on March 1st 1910.

It superintends the work of the Agricultural Societies. The
Canada grants to these societies are paid by the Provincial Department of Agriculture upon the report of the Director of Extension Work. There are over 75 of these societies with a membership of about 11.000. The judges for their fairs and competitions are provided by the Extension Department. The University expends $ 3000 a year for this propose, while the provincial grants amounted to $ 35,543.90 in 1909. Through other agencies the Extension Department seeks to reach the farmers. Meetings are held in varions parts of the province, in winter principally at railway centres, in summer at more remote points.

The meetings are addressed by speakers provided by the Extension Department. In 1909 161 meetings were arranged for at a cost of $ 4738. The attendance reached about 7245.

Excursions to the Experimental Farm at Indian Head are usually held on two or three successive days. Between 3000 and 5000 attend. The cost in 1909 was $ 1125.12.

It is estimated that the Extension Department reaches about 25 000 people at a cost of about $ 17 500. There are in the province over 90.000 farmers.

Professor Bracken has had a portion of the quarter section which was set apart for experimental plots, laid out and prepared for experimental work next year. He proposes to begin a series of experiments on soil fertility, extending over three or four decades

The plots have been laid out in accordance with the latest ideas. In addition to studies in soil fertility there will be experiments with crop rotations, forage crops, plant improvement and methods of tillage.

The College Farm is under the management of Dean Rutherford. During the spring 442 acres were sown with wheat; 35 with barley, 102 with oats and 12 were planted with roots and corn (1); 10 acres are in alfalfa, 1 in red clover, 60 in grass and 160 are being summer fallowed.

The College of Agriculture will not be open for students until the buildings are completed, that is, in November 1911. Meanwhile the Professors in Agriculture will be engaged in Extension Work.

C. P. NORGORD. **Crop Demonstrations on State and County Farms** (2) — *The University of Wisconsin. Agricultural Experiment Station*, Bull. No. 208, pp. 30, fgs. 13. Madison, Wisc., May, 1911. **3103**

The crop demonstrations have proved especially effective in Wisconsin as a means of presenting the advantages of good farm practice to the farmers of various communities. It serves the combined purpose of adapting methods to local conditions, and of stimulating the interest of local leaders in practising these methods. By introducing pure strains of seeds, new methods of tillage, care of crops, etc., on farms of public institutions, the work of the State Agricultural College and Experiment Station is brought nearer to those who need this aid. **United States**

The « demonstration picnic », which is held at each farm where demonstrations are being couducted some time during the summer, has proved to be the best means of bringing the farmers of the neighbourhood to view the crops and to hear them explained by a representative of the Station. Aid is given to individual farmers in the vicinities of these centres, so far as time permits, on the part of the representative in charge of the demonstration; but the effort is made to reach a large number of farmers of the community rather than to help a few individuals.

The lines of work inaugurated of late on most of these farms are as follows: farmers' corn (1) tests, seed selection and breeding corn

(1) Corn = maize.

(2) See *Bulletin;* March 1911, Nos. 725 and 726; and June, 1911, No. 1633.

plant, corn planting, corn cultivation, alfalfa growing, forage crop culture, pure breed seed growing, treatment of grains for diseases, uses of fanning mills, crop rotation, preparation of seed beds and application of manures, growing of hemp, and weed eradication.

Some lessons from the demonstration have been particularly striking. The farmers' corn tests have shown that there is a great need for better methods of seed selection and storing. A sample of well selected, fire-dried " Silver Kiing " corn germinated 95 per cent., gave a 90 per cent. stand, and yielded 85.7 bushels per acre (74.55 hl. per ha); worth $ 42.85 (550 fr. per ha), while an ordinary sample dried outside the pumphouse, germinated 40 per cent., gave a 60 per cent. stand, and yielded 41.7 bushels per acre (36.27 hl. per ha), worth $ 20.85 (267 fr. per ha). The loss due to improper storage was $ 22 per acre (283 fr. per ha). The tests of seed corn used by 330 Wisconsin farmers showed that those samples which were carefully stored and dried, averaged 89 per cent. germination, while those samples that were carelessly stored in barns, corn cribs, or outside buildings germinated only 63.9 per cent.

3104 **Cost of Producing Grapes.** — *Farmers' Advocate.* London, Canada, vol. 46, No. 942, September 28th 1911, pp. 1606-1607.

Great Britain

An extensive fruit grower living in the Niagara peninsula gives exhaustive figures on the cost of producing grapes. Calculations and figures are based on the working of a twenty-acre plantation. The figures arrived at are as follows:

	Per acre
Interest on cost of land, 6 %, at $125.00 . . .	$ 7.50
Labor	» 20.00
Spray materials	» 2.59
Fertilizers	» 8.22
Keep of horses	» 15.60
Interest on capital invested in vines, posts etc., at 6 %	» 4.87
Interest on capital invested in horses, harness, etc., at 10 %	» 3.34
Depreciation of capital invested in horses, harness, etc., at 10 %	» 7.47
Depreciation of capital invested in vines, posts, etc., at 4 %	» 1.74
Taxes and Insurance	» 1.00
Total Cost	$ 72.33

The system of cultivation followed was that practised by the most advanced growers in the Canadian grape-producing belt, from which a yield, greater than the average grower secures, might be expected.

E. LANGENBECK. **Some Figures Obtained by Experiment for Use in the Estimation of Crops.** (Einige Erfahrungszahlen zur Benutzung bei Voranschlägen.) — *Mitteilungen der Deutschen Landwirtschafts-Gesellschaft*, Stück 43. Jahrgang, 1911. 3105

For the estimation of the crop, it is of great importance to know the average ratio of weight of straw and grain.

It is of course necessary to ascertain the total weight of the crop, which is best done by weighing, for mere computation according to the number of waggon-loads is unreliable. Germany

The following figures represent the averages found by the German Agricultural Society as the result of the examination of a large number of statistics:

	Proportion of Grain to Straw		Grain percentage	Straw percentage
Rye	1 : 2	=	33.5	66.5
Winter wheat	1 : 1.9	=	34.0	66.0
Summer wheat	1 : 1.9	=	34.3	65.7
Oats	1 : 1.6	=	38.9	61.1
Barley	1 : 1.2	=	45.6	54.4
Peas	1 : 1.4	=	41.8	58.2
Beans	1 : 1.3	=	44.0	56.0
Rape	1 : 3.2	=	23.8	76.2

These proportions are, naturally, variable.

In dry seasons and on light soils, the proportion of grain is higher, while in wet seasons and on soil which is favourable to the growth of straw, the proportion of the latter is greater.

In estimation, it is further necessary to take into consideration the loss of weight which is caused by prolonged storage in the granary. This is due chiefly to loss of water (called « Schwund » in Germany).

The average loss of water has been ascertained to be as follows:

Wheat (grain)	1 — 1.7 %
Rye »	0.7 — 1.5 %
Barley »	1.3 — 2 %
Oats	2 — 3 %
Potatoes	4 % (3 — 13 %)
Beetroots	11 %
Clover-hay	5.4 %
Meadow-hay	7 %
Straw	4 %

In applying these figures, due regard must be paid to the weather during the year and to the methods of harvesting.

Agriculture
Agricultural Physics, Chemistry, Botany and Plant Physiology.

3106 **British Rainfall, 1910.** On the Distribution of Rain in Space and Time over the British Isles during the Year 1910, as recorded by nearly 5000 Observers in Great Britain and Ireland, and discussed with Articles upon Various Branches of Rainfall Work. By Dr. H. R. Mill. The fiftieth annual volume; pp. 112 + 328 (London: Edward Stanford, 1911), price 10s. Reviewed in *Nature*, vol. 87, No. 2189, p. 481. London, 12 October, 1911.

Great Britain

As in former years, the work is divided into three principal sections, including, *inter alia*, (1) organisation and special articles, (2) monthly and seasonal rainfall and its relation to the average and heavy falls of rain (see *Nature*, February 2), and (3) general table of annual rainfall and number of rain-days at 4874 stations.

In a special article on the greatest rainfall which may occur on the wettest day of the year, it is shown that during the last forty-seven years falls of 4 inches have occurred in a great number of counties, even exceeding 6 inches in a few. Another useful article on the rain-gauge in theory and practice will remove several of the difficulties usually experienced by beginners of rainfall observations. We cannot conclude this notice without expressing regret that this very valuable organisation is not self-supporting, and that a considerable financial burden has to be borne by the director.

3107 **The Defence against Hail.** (La défense contre la grêle). — *L'Avenir agricole de l'Ardèche*, 27e année, n. 10, pp. 226-227. Privas, octobre 1911.

France

General de Négrier and Mr. de Beauchamp, proprietors in the district of Vienne, after a series of studies and scientific tests, have recognized that chemically pure copper is not only an electric conductor of first order, but it exercises also upon the neighbouring electricity an almost unlimited power of attraction.

The steeple of Saint-Julien-l'Ars, in the district of Vienne, was armed with sheets of chemically pure copper capable of attracting all the electricity of the storm clouds; and for this torrent of

electricity a conductor was made, also in sheets of copper, leading to a neighbouring sheet of water where it would lose itself.

These two points, the copper sheets and the neighbouring water characterize the system.

Since this installation was made no lightning or hail has fallen at Saint Julien or in its neighbourhood. Other electric posts, « niagara paragrèles » as the inventors call them, were constructed in Vienne, and it has been observed that between two « niagaras » placed at a distance of about 10 kilomètres, (6.2 miles) one from the other, the imaginary line that connects them forms a sort of barrier that the electric cloud cannot pass.

Consequently the lightning conductors of the protected districts have become useless; their suppression would not be at all dangerous and, as their upkeep is costly, municipalities and private proprietors would effect an economy by so doing.

The members of the town council of Paris and a commission of the Senate visited the place to study the matter.

Monsieur Violle, professor of physics at the « Conservatoire des Arts et Métiers » of Paris, and Fellow of the Academy of Science, made several official communications before the Academy. Monsieur Le Cour-Grandmaison, during the discussion of the budget for Agriculture, on the 20th of June last, confirmed before the Senate the reality of the facts observed, and the agricultural group of the Senate appointed a special commission, and obtained the assistance of the Government for extending and generalising this discovery.

P. Mazé. **A new Experimental Method to be Applied to the Exhaustive Study of the Physiological Functions of the Higher Plants.** (Recherches sur la Physiologie végétale, Premier Mémoire: Nutrition minérale des végétaux, absorption et excrétion des éléments par les racines et par les feuilles. Excrétion des substances organiques). *Annales de l'Institut Pasteur;* 25e A., N. 10, pp. 705-738 + ph 12 + pl VII. Paris, Octobre 1911. **3108**

The author calls attention to the fact that the best means of obtaining good harvests, successful from an economic standpoint, is to make a judicious use of chemical manures. For this it is essential to understand the requirements of the different plants under culture, as well as the physiology of vegetable nutrition. **France**

M. Mazé is of opinion that scientific progress is paralysed, not so much from poverty of ideas as from the lack of experimental

methods fitted to verify them. He therefore lays great stress on the necessity of cultivating the higher classes of plants in nutritive solutions free from bacteria, whenever it is a quest on of studying their physiological functions.

In his opinion, methods of ordinary mineral solutions renewable at will; of solid mediums such as sand, charcoal, sawdust, glass, earth, etc., divided in pots; or culture in the open ground, all of which processes have been used for more than half a century by hundreds of investigators, have now exhausted all they had to teach. But he recognizes them as having so far constituted a most valuable means of research, the entire science of culture being based on the knowledge acquired by their aid.

The method suggested by the author is that of cultures and solutions freed from bacteria. It is, however, a method which will only bear convincing results on condition of its benig used in media suited to the complete growth of the plant, i. e. from the period of germination to that of the ripening of the seed. It is also indispensable that plants treated in this manner should develop as rapidly as those grown in the best soils.

The application of the method is very simple. The first thing is to make the plants develop in a complete nutritive solution protected from bacteria; in this manner it is possible, in favourable temperature, to obtain, at the end of three or four weeks, plants of maize, for instance, weighing from 15 to 16 gr., in dry condition, in 3 litre flasks. It is then permissible to subject them to varied treatment when they have reached the requisite development. For this the remainder of the nutritive solution must be drawn off, the roots and flask washed repeatedly in sterilised distilled water, and the solution then introduced, having been previously sterilised, the influence of which on the development of the plant is to be determined.

This method, also styled by the author method of interrupted nutrition, he considers of extreme value in the study of physiology. He has already employed it in studying the formation of citric acid in fungi.

By applying it to the higher plants, he considers it will be possible to attack and solve problems of the most arduous nature, because it involves quantities that can be easily weighed and thus the results, upon the influence of which the development of the plant depends, may be easily calculated.

The author further enlarges upon the earliest results obtained in applying this method to the study of the growth of maize in

a complete mineral solution. These results have already been published in a Memorandum to the Academie des Sciences in Paris (1).

H. B. HUTCHINSON and N. H. J. MILLER. **The Direct Assimilation of Inorganic and Organic Forms of Nitrogen by Higher Plants.** (Rothamsted Experiment Station. Lawes Agricultural Trust; Harpenden). — *Centralblatt für Bakteriologie*, etc, II Abt., Bd. 30, No 21, pp. 513-547. Jena, 24. Juli 1911. 3109

Before describing their own experiments on the assimilation of ammonium salts and other nitrogenous compounds by plants, the writers give a detailed account of the work already done, referring especially to the most recent experiments carried out in sterile media. Great Britain

The results of all the experiments described are summarised as follows.

As regards ammonium salts the results obtained by Griffiths and Mazé seem to prove conclusively that beans and maize assimilate nitrogen in this form as readily as nitrates. The same may be said of Kossowitsch's experiments with peas, for although sterilisation was imperfectly maintained, nitrifying organisms at any rate, were completely excluded. Bréal's results may also be considered to establish the utilisation of ammonia by *Poa annua*. The results obtained by Pitsch, Müntz, Gerlach and Vogel, and Krger indicate that the various plants employed are able to grow in absence of nitrates, but fail to prove that ammonia was the sole source of nitrogen.

Nitrites have been shown by Molisch, M. Schultz and by Perciabosco and Rosso to be assimilated by various plants from sufficiently dilute solutions. Perciabosco and Rosso found that plants supplied with nitrogen in this form contain higher percentages of nitrogen than with nitrates as source of nitrogen. This is also the case, as will be shown later on, when plants take up all, or most, of their nitrogen as ammonium salts.

Experiments with other inorganic forms of nitrogen—amidosulphonic acid, hydroxylamine, diamide, and azoimide—have all given negative results up to the present time.

As regards organic compounds the great majority have given negative, if not uncertain results. More or less satisfactory evidence of assimilation has been obtained with the following compounds:

(1) See Abstr. 2072, *Bull.* July 1911. (*Ed.*).

methylamine, amylamine, allylamine, dimethylamine, acetamide, choline, betaine, leucine, urea, dicyanodiamide, aspartic acid, asparagine, glutamine, allantoin, uric acid, hippuric acid, tyrosine and humic acid. The gains of nitrogen have, however, generally been very small, and in many cases negative results have been obtained by other investigators.

The writers' experiments concerning the direct assimilation of ammonium salts by plants were made in six series: Series I, Wheat grown in sand; Series II, Wheat grown in water cultures; Series III, Peas in water cultures; Series IV, Peas in water cultures with various forms of nitrogen; Series V, Peas in water cultures with organic nitrogen; Series VI, Peas in water cultures with different forms of nitrogen, chiefly organic. In order to obtain vigorous seedlings free from nitrifying and other organisms, some preliminary experiments on seed sterilisation were made.

The conclusions arrived at from the results of these experiments are as follows:

The results so far obtained are not sufficiently numerous to make it possible to trace any connection between the assimilability or the reverse of nitrogenous compounds and their constitution. The original intention of commencing with only the simplest compounds, which are obviously the most suitable for experiments of this kind, could not be adhered to, owing to the impossibility of sterilising many of the most desirable substances without more or less complete decomposition. So that it only remains to group the various substances according to their availability, as sources of nitrogen, as indicated by the experiments described above:

I. Readily assimilated: Ammonium salts; Acetamide $CH_3 CO. NH_2$; Urea $CO<^{NH_2}_{NH_2}$; Barbituric acid (with calcium carbonate) $CO<^{NH.\ CO}_{NH.\ CO}>CH_2$; Alloxan. $CO<^{NH.\ CO}_{NH.\ CO}>CO$; Humates.

II. Assimilated: Formamide, $H. CO. NH_2$; Glycine, $NH_2, CH_2 COOH$; α-Aminopropionic acid, $CH_3 CH (NH_2) COOH.$; Guanidine hydrochloride, $NH : C<^{NH_2}_{NH_2}$; Cyanuric acid, $CO<^{NH.\ CO}_{NH.\ CO}>NH.$; Oxamide, $^{CO.\ NH_2}_{CO.\ NH_2}$; Sodium aspartate, $^{CH\ (NH_2)\ COOH.}_{CH_2\ \ COOH}$; Peptone.

III. Doutbtful: Trimethylamine; para-Urazine $CO<^{NH.\ NH}_{NH.\ NH}>CO.$; Hexamethylenetetramine.

IV. Not assimilated: Ethyl nitrate; Propionitrile; Hydroxylamine hydrochloride; Methyl carbamate.

V. Toxic: Tetranitromethane.

The above grouping is, of course, only provisional and applies only (except as regards ammonium salts) to peas. It is possible that other plants may be able to utilise some of the substances which with peas have given negative results.

A bibliography is appended, indicating the work of 76 Experimenters.

L. MONTEMARTINI. **The Stimulating Effect of Sulphate of Manganese and Sulphate of Copper on Plants** (1) (L'azione eccitante del solfate di manganese e del solfato di rame sulle piante). — *Le Stazioni sperimentali agrarie italiane*, Vol. XLIV, Fasc. 7, pp. 564-571. Modena, 1911. **8110**

The writer has experimented on the stimulating action of sulphate of manganese and of sulphate of copper, in very diluted solutions, on the respiration and chlorophyll assimilation of the leaves of several cultivated plants (the vine, lupins, haricots and potatoes), and of the flowers of certain ornamental plants (*Leucanthemum* sp., *Ageratum* sp.). **Italy**

This action was determined by the amount of carbon dioxide liberated or decomposed in connection with the amount of salts absorbed.

After seventy-one experiments it would seem to be established that sulphate of manganese and sulphate of copper, if absorbed in small quantities, have a stimulating effect on plants.

The effect on respiration varies:

1) According to the plants. Thus the vine is much more sensitive than haricots and potatoes; and *Leucanthemum* more than *Ageratum*.

2) According to the organs. Thus flowers are more sensitive than leaves.

3) According to the development. Thus closed flowers are more sensitive than open ones.

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(1) See also: *The Science and Practice of Farming during* 1910 *in Great Britain*, p. 129. (Rome; Int. Inst. Agr. 1910); p. 233 *Bull.* Dec. 1910, Nos. 1362 and 1363 *Bull.* May 1911; N. 2090, *Bull.* July 1911. A full bibliography on this subject is given in the monographs of Mr. BARTMANN (*Journ. d'Agr. prat.*, 1910 1er semestre), and of Mr. ROUSSET (*Ann. de la Soc. Agron. de France*, 1909). (*Ed.*).

Lastly the assimilation of chlorophyll is much more stimulated than the respiration, and it varies also to some extent according to the plants.

The experiments were carried out at the Botanic Institute of Pavia.

3111 **Links with the Past in the Plant World.** — *Nature*, Vol. 87, No. 2189, p. 503. London, October 12, 1911.

The possibilities of plant dispersal by natural agencies have recently received a striking demonstration in the recolonisation of the island of Krakatoa, in the Sunda Straits. In 1883 Krakatoa, then covered with a dense tropical vegetation, was partially destroyed by a series of exceptionally violent volcanic explosions. It is believed that no vestige of life remained. In 1906, twenty-three years after the sterilisation of the island, 137 species of plants were collected, and the vegetation was in places so dense that a party of botanists penetrated with the greatest difficulty beyond the coastal belt. Some of the trees had reached a height of 50 feet. The nearest islands, except the small island of Sebesi, about twelve miles distant, are Java and Sumatra, separated from Krakatoa by a stretch of water twenty-five miles in breadth. This new flora, introduced by ocean currents, by wind, and by the agency of birds, affords a useful object-lesson in regard to the efficiency of plant-dispersal without the aid of land-connections.

3112 SCHREINER and REED. **Recent Soil Investigations.** — *Nature*, Vol. 87. No. 2186, p. 393. London, 21 September 1911.

It is well known that the United States Bureau of Soils does not attach the same importance to a chemical analysis of the soil as is usual elsewhere. The argument adopted is that all soils contain the same rock minerals, and therefore the soil solution from which plants derive their nourishment must be identical in composition, so far as mineral plant food is concerned, in all cases. But inasmuch as the aqueous extracts of different soils show the same kind of differences towards plants as the soils themselves, it follows, if the original hypothesis be true, that the infertility of the poor soils must be due to some toxic organic substance. Search is therefore being made for substances of this nature, and during the progress of the experiments numerous interesting fields are opening up. Evidence has, for example, been obtained which is considered to prove that the roots of growing plants, and particularly the root

United States

hairs, pessess an extracellular oxidising power; which power is greatest in fertile soils. The oxidation is attributed mainly, if not entirely, to the activity of a peroxidase produced by the roots. Messrs. Schreiner and Reed also consider that soil itself can effect oxidations closely analogous to those of an oxidase, although, in their view, the process is mainly non-enzymotic.

In addition to the research work going on, the Bureau of Soils is also engaged on a soil survey of the States, the results of which are issued in the form of circulars dealing with particular soil types. The basis of the survey is the mechanical analysis of the soil; but the officer in charge makes full local investigations, so that the report always takes account of the agricultural conditions. Among the reports issued, so far, are those dealing with the Portsmouth sandy loam, the Sassafras silt loam, the Norfolk fine sandy loam, and the Norfolk fine sand. In a generhl introductory circular, Dr. Whitney describes in non-technical language the kind of examination that is made in the laboratory, and the limitations to which soil analysis is subjected. The account will be found of great use to others engaged in this work.

GERLACH. **On the Quantity of Water and of Nutritive Substances Carried off by Infiltration or Drainage.** (Uber die durch Sickerwässer (Drainagewässer) dem Boden entzogenen Mengen Wasser und Nährstoffe). — *Illustrierte Landwirtschaftliche Zeitung*, 31 J., No. 80, pp. 755-756. Berlin, 7 Oktober 1911. **8113**

Investigations were made in the drain-gauges of the Kaiser Wilhelm Institute at Bromberg from 1st June 1906 to 8th August, 1910. The following is the order of experiments made: **Germany**

	With manure	Without manure
1st year	fallow	fallow
2nd »	potatoes	potatoes
3rd »	oats	oats
4th »	rye	rye
5th »	oats	fallow

Length of experiments: 1540 days; rainfall, 2236.2 mm. (88.02 in); per gauge (area 4 sq. meters), 8,944.8 litres; per hectare, 22,362 cu.m. (per acre 319,440 cu. ft).

From the observations made it results that unmanured soil in drain-gauges allowed more water to filter through than that manured. In the same manner, the unmanured gauges allowed

from 9.5 to 30.4 % of the rainfall to percolate; whilst manured gauges respectively allowed from 7.3 to 24.2 % to percolate.

However, the water evaporated from manured plants seems to have been utilised with greater advantage than that from non-manured ones. In fact, for the production of one part by weight of dry matter above ground, the plants on the manured drain-gauges appear to have evaporated from 359.4 to 632.5 parts of water, whilst those on the unmanured ones evaporated from 415.6 to 1149 parts.

The figures obtained clearly show that during the period of cultivation the amount of drainage was comparatively less on the cropped than on the fallow gauges, and that the loss of nutritive substances was similarly inferior. In fact, the percentage of losses in drainage water and escape of nutritive substances were as follows:

	Drain-gauges			
	Manured		Un-manured	
	Fallow	Cultivated	Fallow	Cultivated
Drainage	72.84	27.16	74.79	25.21
Nitrogen	75.40	24.60	70.71	29.29
Potash	77.30	22.70	82.00	18.00
Lime	76.70	23.30	78.09	21.91

3114 Oswald Schreiner and Elbert C. Lathrop. **Examination of Soils for Organic Constituents, especially Dihydroxystearic Acid.** (1) — *U. S. Dpt. Agr. Bureau of Soils. Bull. No.* 80, pp. 33. Washington, September 5, 1911.

The summary of this Bulletin is as follows:

This investigation is a partial survey of the nature of soil organic matter in the soils of the United States. Soils from 18 different States, extending from Maine to Oregon and southward to Texas, of widely different origin, topography, texture, climate, drainage and cropping, varying from soils of the highest productivity to soils incapable of producing profitable crops, were examined for definite organic soil constituents.

United States

To facilitate this examination, the numerous individual methods for the separation of these compounds have been so coordinated as to form a single comprehensive procedure of analysis.

(1) Cp. *Bull.* p. 217-218 December 1910; Abstrs. 57 and. 60 *Bull.* January 1911; Abstrs. 756 and 758 *Bull.* March 1911. (*Ed.*).

In the soil so examined, pentosans, pentose sugars, histidine, cytosine, xanthine, hypoxanthine, and dihydroxystearic acid were quite frequently encountered and the results indicate that these substances will be found to be widely distributed.

Arginine, agroceric acid, lignoceric acid, and monohydrostearic acid, agrosterol, phytosterol, and hentriacontane were only occasionally found, but no general statement as to their limited occurrence can be made.

The frequent occurrence of dihydroxystearic acid is of special interest and significance because of its known harmful properties to plants. One third of all the soils examined showed the presence of this compound. It was found in virgin soils as well as in soils under long cultivation; in soils continually cropped as well as in soils under permanent sod; in soils from the Atlantic coast; in soils from the Pacific coast; and in soils from the Gulf States. This compound is, therefore, a common soil constituent and is likely to be encountered in soils anywhere. Its formation or its accumulation is doubtless due to local conditions in any one section, but these local soil conditions are not confined to any region of the United States, and probably not to any country or continent. When the soils examined are separated into good and poor soils, as based on field observations, their relationship with dihydroxystearic acid is rather striking. Among the good soils only two contained dihydroxystearic acid and they were of only moderate productivity. Among the poor soils the percentage of those containing this compound was 51. Of the soils which had a record of infertility, the dihydroxystearic acid was found in each and every case.

Judging from the foregoing relationship, established by this investigation, it would seem that dihydroxystearic acid is either a direct or indirect factor in the low productivity in soils; direct by virtue of its harmful effects on growing crops, indirect as an indicator of other compounds or conditions which cause soil to become less productive and even infertile. It is not possible to state, from the data at hand, that dihydroxystearic acid is the only factor which contributes to the infertility or unproductivity in those soils in which it was found, for it must be remembered that this is only one of many compunds, both organic and inorganic, harmful and beneficial, which exist in soils, any and all of which play a part in its relative fertility and infertility. It is certain, however, that the determination of even this one constituent leads to a recognition of a kind of infertility in the soils examined, and is, therefore, a readily recognised symptomatic factor of poor soil conditions."

3115 C. C. GEORGESON. **Maintenance of Fertility in Alaska Soil.** — *Annual Report of Alaska Agricultural Experiment Stations for* 1910, pp. 33-39 (85 pl. XIII). Washington. 1911.

Frequently statements from travellers and other observers are seen to the effect that the soil of Alaska must be exceedingly rich in plant food, to judge from the height of the grasses and the luxuriance of some of the vegetation, but such a conclusion is not warranted by Mr. Georgeson. He states that the soils of Alaska are not rich. Grasses will sometimes grow rank on an almost barren gravelly soil because they have plenty of moisture, and thy are adapted to the climate and the conditions. The virgin soil in the interior is everywhere frozen to an unknown depth or to the bedrock. In this state of refrigeration there can be no activity of the organisms which aid in the formation of mould and the preparation of plant food from organic matter, and what plant food the soil may hold is in a large degree insoluble, and therefore not available for plants except by a long and slow process of weathering. For this reason the soils in Alaska soon become exhausted, and the problem is how to increase this limited store of available plant food.

United States: Alaska

Mr. Georgeson points out two chief ways :

One is to raise a crop on the land only every other year and summer fallow the intervening years. That is to say, give nature time to act upon the soil and gradually change the plant food in the soil from its insoluble to a soluble form. This is the practice followed in the famous wheat-growing districts of eastern Washington, Oregon, and Idaho.

The other way is to apply fertilisers, and as far as the interior of Alaska is concerned this will be an expensive form of maintaining fertility. If concentrated fertilisers are shipped, the freight will at least double or more than double the original cost of material. Stable manure can be had in only limited quantities. One method of fertilizing is to plough under green crops, whether it be grain, rape, buckwheat, grass, clover, or anything that can be grown for the purpose ; still another method is to maintain fertility by cultivation of leguminous plants in a well-ordered rotation. The Alaska farmer will probably have to resort to all of these, but it is especially the last way which will receive the attention of the Alaska experiment stations.

The problem is to find the leguminous plants which are suited for cultivation in rotation. Mr. Georgeson hopes that they have been found in the several alfalfas introduced by Prof. N. E. Hansen, of South Dakota. As to the three alfalfas — *Medicago falcata*, Grimm

alfalfa, Montana alfalfa — tested at Rampart Station, their possible value is yet unknown. If these alfalfas fail, probably white clover may prove serviceable, or perhaps Alsike clover may be preferable, if sufficiently hardy, because a more vigorous grower; these clovers will survive in the interior if protected by a normal snowfall which is not blown off. If this crop is seeded in the spring of one year and ploughed under for winter grain in the latter part of July of the following year, it should not only prove a valuable fertiliser to the soil, but should have furnished good pasturage in the meantime.

Still another way of preparing the soil for grain is pointed out, that is, to rotate with potatoes. A potato crop exhausts the soil, but it has the advantage that, if properly cared for, the soil must be cultivated several times during the season, ending with a thorough stirring when the potatoes are dug, which operations have in a less degree the same effect as summer fallowing.

The Author concludes that, as the work at the Alaska experiment stations proceeds, problems unfamiliar to the farmer in more southern latitudes constantly come up for solution, and it is the province of the four Alaska experiment stations to solve such problems, if they can.

L. Felsinger. **Fixation and Elimination of Nitrogen.** (Stickstoffbindung und Entbindung. Arbeiten der Landwirtschaftlichen Laboratorien und der Versuchswirtschaft der k. k. Hochschule für Bodenkultur. Aus dem Institute für Pflanzenproduktionslehre.). — *Zeitschrift für das Landwirtschaftliche Versuchswesen in Oesterreich*, Jahrg. XIV, Heft 9, pp. 1039-1103, tbl. XXI. Wien, Sept. 1911. **3116**

Agricultural bacteriology has shown that the transformations of nitrogen by the action of biologic forces stand in relation to the quantity and state of combination of the nitrogen, as well as to the quantity and state of combination of the carbon. **Austria**

In this first communication the writer limits himself to studying combinations of nitrogen. He has conducted a long series of experiments, using impure cultures in solution, with 1 gr. of dextrose per culture. At first he added nitrates, nitrites, and compounds of ammonia, in different very strong proportions. He then induced albuminoid putrefaction with the same nitrogenous substances, either alone, or mixed in different proportions with straw, manure, horse's urine, bean meal, cotton meal, dried blood, ground clover.

The conclusions are as follows ;

1. The transformations of carbon in the solutions containing very soluble nitrogen and of the respirable carbon stand in relation to the quantities of these bodies.

2. If nitrogen be given under the forms of ammonia, of nitrate or of nitrite, and the carbon under the form of dextrose, an equilibrium is set up betwen the nitrogen and carbon ; that is to say, the nitrogen is not fixed or eliminated, when the dextrose and the nitrogen are in the ratio of 100 : 0.5 or 1 ; below this proportion it is fixed, and above it is eliminated.

3. In aerobic conditions, if there are 20 parts of nitric nitrogen, 10 parts of nitrous nitrogen or 3 parts of ammoniacal nitrogen ; and in anaerobic conditions, if there are 25 parts of nitric nitrogen and 15 parts of nitrous nitrogen to 100 parts of dextrose, there always remains in the impure cultures some nitrate, nitrite or ammonia.

4. If organic nitrogenous substances be allowed to putrefy, the nitrogen transformations take place in the same ratio. But the figures have different values, in proportion to the solubility and the resistance of the carbon and nitrogen compounds.

5. These states of equilibrium between nitrogen and carbon vary during the decomposition of the carbon compounds and their consumption by means of respiration. But the tendency is always towards the state of equilibrium, which is reached when the process of decomposition is completed. For in nature every nitrogen transformation reaches this equilibrium.

Although these conclusions have not been obtained from experiments carried out in the soil, it may be supposed that the relations established are equally true for organic manure.

3117 H. Euler. **On the Velocity of Formation of Enzyme Systems.** — *Nature*, Vol. 87, No. 2187, p. 436 - London, September 28, 1911. Abstract of Paper read at Brit. Assoc. Meeting, Portsmouth, Sept. 1911.

Great Britain

The results described, though of a preliminary character, were significant as showing how the amount of a particular enzyme in an organism can be caused to increase by cultivating the organism for several generations under suitable conditions. Experiments on the formation of invertase and of enzymes fermenting glucose and galactose were described. Prof. Euler had been unable to train certain yeasts to acquire the power to ferment galactose. In discus-

sing the paper, Dr. E. F. Armstrong expressed the belief that there was an a essential difference between the power to acquire an entirely new enzyme and that of regaining an enzyme, which had not been required by the yeast for many generations, and so had fallen into disuse. The former was impossible, whereas many brewery yeasts were able to regain, as the result of training, the lost property of fermenting galactose.

R. GREIN-SMITH. ***Rhizobia* in the Soil. Contributions to a Knowledge of Soil Fertility. No. 2. The Determination of *Rhizobia* in the Soil.** (1) *Nature* Vol. 87. No. 2189., p. 507-508. London, 12 October 1911. **3118**

From a perusal of the literature upon the fixation of nitrogen by the bacteria in the soil, one is led to believe that *Azotobacter* is the most active. It is not known how many of these organisms may be contained in 1 gram of soil: and, from Löhms's work, we imagine that the numbers of nitrogen-fixing bacteria are small. By making use of a special medium described in the paper, the author has found as many as three millions of nitrogen-fixing *Rhizobia* in 1 gram of agricultural soil. The foremost place in the work of nitrogen fixation should, therefore, be given to *Rhizobium* rather than to *Azotobacter*, until it is found that the latter is at least half as numerous as the former. The numbers of *Rhizobia* in the soil afford an indication of its comparative fertility. **Great Britain**

O. HAGEN. **Experiment on *Mucorineae* and their Action in the Soil.** (Untersuchungen über norwegische Mucorineen II). — *Skrifter udgivne af Videnskabs-Selskabet i Christiana*, Mathem.-Naturw. Klasse 1910 No. 4 pp. 152. Christiania (1910) 1911. **3119**

In a preceding article the writer has given a preliminary sketch of the soil mucorineae.

Further research, on his own part and that of others, has led to the identification, up to the present moment, of about 30 species. (*Mucor* sp., *Absidia* sp., and *Zygorhynchus* sp.). **Norway**

(1) Cp. *The Science and Practice of Farming during* 1910 *in Great Britain* pp. 183-187, p. 216 *Bull.* Dec. 1910; Abstr. 54 *Bull.* Jan. 1911; Absr. 745 *Bull.* March 1912: Abstr. 1657 and 1618 *Bull.* June 1911: Abstr. 2080 *Bull.* July 1911. (*Ed.*).

The mucorineae form an integral part of the subsoil fungoid flora where most of them are to be found.

They vary according to the nature of the soil, those occuring in cultivated soil are very different from species from coniferous forests. Their relations with mycorhiza are not yet sufficiently established. In any case, it has been found that mucorineae which develop from roots invested with mycorhiza are mostly of the same species as those which are usually found in similar soil. Instances of this are *Mucor hiemalis* and *M. Ramannianus* which occur on the roots of conifers. Mucorineae can be either facultative or obligatory hosts of higher fungi, but most frequently they are the former. The most common are *M. Flavus, M. silvaticus* and several species of *Mortierella*. The latter occur in the soil, and are only found upon fungi which are in a decomposed state. Amongst those mucorineae which are obligatory hosts of superior fungi are probably the following genera: *Spinellus, Dicranophora* and *Sporochinia*. They have never yet been discovered in the soil but only upon *Agaricineae* in the first stage of decomposition. Only a limited number of species have any effet upon the balance of nitrogen in the soil by their action upon the nitrites and nitrates. These species are always the same and their action seems to be due to the same property of their protoplasm. The nitrates are transformed into nitrites and ammonia, the nitrites into ammonia. Thus we have here to do with a reduction of which the final product is ammonia, which latter substance can be at once employed in the synthesis of albumen.

Experiments made with organic and inorganic ammonium salts proved that the latter, with the exception of nitrates, gave rise to an injurious accumulation of acid anions, and further that the nutritive value of these salts is in inverse ratio to the affinities between the acid ions and those of ammonium. Of organic acids so far only malic acid has been investigated and it has proved a good source of nitrogen.

The same applies to urea added to glucose in the case of all the species experimented upon. Ammonia is also formed, but in a variable amount. Uric acid is also a source of nitrogen, while acetamide is, on the contrary, almost useless from this point of view.

Amino-acids have therefore very little nutritive value alone, but with glucose they form a rich source of nitrogen. Only a few mucorineae have the power of transforming hippuric acid. Peptone alone, or in combination with sugar, gives rise to a considerable amount of ammonia.

The formation of ammonia having been always observed, it is concluded that the reabsorption of nitrogen by fungi is accom-

panied by the formation of ammonia which is probably the first step in albumen synthesis.

With regard to the reabsorption of carbon, the writer affirms that soil mucorineae are incapable of attacking non-nitrogenous organic substances, at all events in cases where ammonium salts are the source of nitrogen. Monosaccharides, *i. e.* maltose etc. (and also peptone) are easily broken up, also pectic acid and especially saccharose and glucosides, while glycerine, mannite, lactose, inulin, starch, xylane and cellulose are almost without nutritive value.

The formation of oxalic acid by some species of *Absidia* has been noted, and probably that of citric acid by species of *Mucor*. The limits of low temperatures (+ 7° + 10° C.) as well as those of high temperatures (+ 27° C. + 30° C.) are, as can be seen, fairly low. The optimum is between + 20° and + 25° C.

From the point of view of practical agriculture, the following are the principal conclusions.

(1) Mucorineae are of variable importance in the reabsorption of organic and inorganic substances in the soil according to whether these substances are nitrogenanous or not.

(2) Most non-nitrogenous organic substances, especially cellulose and hemi-celluloses are not attached by mucorineae, although compounds like the monosaccharides, disaccharides and pectic substances are changed.

(3) Nitrogenous compounds, however, are usually altered by Mucorineae.

(4) The importance of the soil Mucorineae, as of the soil moulds in general, should, as far as the balance of nitrogen present is concermed, be considered from the two following points of view.

(*a*) the ammoniacal nitrogen already present is transformed by these fungi into a very stable form of albumen and is therefore useless to higher plants.

(*b*) the aminic or amidic nitrogen of the numerous organic substances of the soil is rapidly transformed into ammoniacal nitrogen, of which part is again built up by the same fungi into albumen, while the other part circulates through the soil, and can thus be utilised by higher plants.

The book is provided with an exhaustive bibliography.

The experiments were carried out in the Botanical Laboratory of the University of Christiania.

3120 **Schemes of Drainage in Macedonia.** (Entwässerungsarbeiten in Macedonien). — *Osterreichische Monatschrift für den Orient.* N. 10 P. 154. Wien, Oktober, 1911.

Turkey

The Turkish Government has sent an engineer to Macedonia to study the question of draining lakes Yenidsche Göl and Kara Asmaok. The former of these is situated at a distance of 35 km. from Salonica and is crossed by the river Moglenitza. The engineer proposes bruilding a canal for this purpose which is to cost 40.000 Turkish pounds (about 1 million francs).

3121 **Irrigation in Mesopotamia.** (Mesopotamische Bewässerungsprojekte) *Deutsches Kolonialblatt.* N°. 20, p. 769. Berlin, 15 Oktober, 1911.

Ottoman Empire

In 1910 Sir W. Willcocks completed his designs for the irrigation of Mesopotamia. The construction of the barrage at Hindla is practically achieved ; two years more will see the completion of the rest of the work and by the middle course of the Euphrates it will be possible to grow cotton and cereals. At the same time work was started at Habana on the west side of the Euphrates for the purpose of carrying off and distributing, every spring, the surplus waters that inundate and destroy the crops at least every three years.

3122 **Irrigation Works in Argentina.** (1) — *The Pan American Union.* p. 630. Washington, September, 1911.

Argentina

An executive decree passed in Argentina on June 30, 1911, approves the plans and specifications for the irrigation canal to be constructed on the island of Choele Choel ; the sum authorized for the work is 577.162 pesos.

In la Cienaga, Jujuy Province, there will be built a dam, the foundation stone of which was laid early in July, for the irrigation of a vast area of land in the Provinces of Salta and Jujuy.

Next in size and importance to the irrigation works now being carried out in the valleys of the Menquen and Negro Rivers, are those which will soon be undertaken in the department of Rio Tercero, Province of Cordoba, utilizing the waters of this river. The system will irrigate a vast area of 55 000 hectares of fertile land, and will consist of a stone dam, retaining 291 793 500 cubic meters of water, a distributing canal, and motive-power plant.

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(1) Cp. Abstr. 1137 *Bull.* April 1911. (*Ed.*).

The Use of Chemical Manures in Italy (Il consumo dei concimi chimici in Italia). — *L'Italia Agricola.* A. XLVIII. N. 20. pp. 463-465. Piacenza, 30 Ottobre, 1911. — A. MENOZZI. Quanto spende l'Agricoltura Italiana per Concimi chimici ? *L'Agricoltura moderna.* A. VII. N. 43. pp. 589-599. Milano, 29 Ottobre, 1911. 3123

The Italian Federation of Agricultural Syndicates has drawn up a statistic of the wide use made in Italy of chemical manures, adhering to the method of judging from first hand information only. This information has been furnished bythe Co-operative Agricultural Societies, by the Travelling Lectureships of Agriculture and by the various agricultural institutions for instruction and propaganda. The amount supplied by manufactures and dealers has also been taken into acconnt, as well as the official statistics of foreign commerce The various supplies may be summed up in the folowing table, for 1909 : Italy

Region	Supers	Basic Slag	Nitrate of soda	Sulphate of amm.	Chlor. and Sulph of potash, Kainite
	tons	tons	tons	tons	tons
North Italy . . . . . (Piedmont, Liguria, Lombardy, Venetia, Emilia).	710 600	100 900	33 010	21 630	11 070
Central Italy . . . . . (Tuscany, The Marches, Umbria, Latium).	123 200	10 180	7 630	5 760	1 181
South Italy . . . . . (Abruzzi and Molise, Campania, Puglie, Basilicata, Calabria).	72 140	930	4 500	3 058	825
Insular Italy . . . . . (Sicily, Sardinia).	63 100	276	532	1 462	335
Total, for the whole Kingdom of Italy	969 040	112 286	45 672	31 910	13 411

Even if not absolutely accurate, these figures prove that the pursuit of agriculture increases as we go from south to north. This may be explained by the predominance of the cultivation of herbaceous plants and by a more abundant and more equally distributed rainfall in North Italy. But the exceptions met with in some of the southern provinces and in Sicily would go to prove that the progress made in agricultural technique makes it possible, even in the South, to create conditions favourable to the successful employment of chemical manures. Other useful hints may be gathered from these statistics regarding the use of manures compounded of

phosphates and nitrogen which are employed in variable quantities according to the predominance of certain crops. In this respect a general part is played by the Leguminous plants ; next come the special crops as rice, hemp, beets, vegetables, etc. in certain localities.

The lessons to be learned from the relation betwen the quantities of potassic and other chemical manures are less definite, as the advisability of employing potash depends chiefly on the amount held in reserve by the soil itself.

And now it is interesting to compare these statements with those drawn up by Professor Menozzi, director of the chemical laboratory of the Royal High School of Agriculture at Milan. Drawing his conclusions from the various statements, agricultural and industrial, he lays down figures which, it would seem, are for the most part very near the truth. According to them the following is the annual consumption of chemical manures :

Mineral superphosphate	tons	1 000 000	£.	2 560 000
Bone superphosphate	»	50 000	»	180 000
Basic slag	»	100 000	»	240 000
Nitrate of soda.	»	50 000	»	500 000
Sulphate of ammonia	»	32 200	»	458 000
Potash salts	»	7 690	»	80 000
Organic nitrogenous manures . .	»	—	»	40 000

That is to say, Italian agriculture spends, at the present day, over 100 millions of francs in chemical manures. It is a confirmed fact that the consumption is greatest in North Italy : Lombardy, Venetia, Emilia and Piedmont ; less so in Central Italy : Tuscany, the Marches and Umbria ; and still less in Southern and Insular Italy. At the same time, Professor Menozzi does not fail to note a certain degree of progress even in these latter regions and calls attention to the ever increasing consumption of phosphates in Sicily.

He concludes with the significant remark that he foresees the day when, even in Central and Sonthern Italy consumption will increase with remarkable rapidity ; and even though, for climatic and other reasons, and the special requirements of certain plants, it shou'd never equal that of Northern Italy, it may yet grow to three and four times its present amount.

The Production of Nitrate in Chile (1). (Salpeterproduktion in Chile) 3124
Das Handelsmuseum, No. 41, S. 631. Wien, 12 Oktober 1911.

The financial year that ended on the 30th. of June last shows that the nitrate industry is in excellent conditions, having obtained a production of 54 297 531 Spanish quintals (a Spamish quintal = 101.4 lbs avoirdupois). The price increased from 1.64 dollars (about 6 *s* 11 *d*) in July 1910, to 1.84 dollars (about 7*s* 8 ½ *d*) in July 1911. Chile

Four new works have been opened during this year; making a total of 158.

The production for this year will be 55 500 000 quintals at least.

The nitrate industry represents abont 75 % of the total exports from Chile, and 60 % of the total income of the conntry.

Utilization of Sewage Sludge for the Production of Lighting Gas and Sulphate of Ammonia. (Utilisation des boues d'égout par production de gaz d'éclairage et de Sulfate d'ammoniaque). — 3125
L'Engrais, 62e Année, No. 42, p. 1165. Lille, 20 Octobre 1911.

At Brünn (Moravia) a solution has been found for the problem concerning the utilization of sewage sludge which can not be so easily disposed of as the sewage water which is let in to the river, after being clarified, or run on to the fields. Gas for lighting is produced from the sewage sludge by means of the following process. On the first place the sludge is put to dry until its volume has been reduced by a fourth; it is afterwards snbmitted to a dry distillation, 23 cubic meters of good lighting gas, 63 kg. of coke and 0.75 kg. of sulphate of ammonia, are obtained from every 100 kg. of sewage sludge. Austria. France

Without considering that with this process the difficult problem of disposing of sewage sludge is entirely resolved, a high financial profit can be obtained in the enterprise, and the expenses of installation are rapidly covered, as only 2 kg. of cheap coal is sufficient for drying 100 kg. of sewage sludge.

At a meeting of gas experts which recently took place at Marseilles, the process applied at Brünn was for the first time discussed; the adoption of this method for utilizing the sewage sludge in all the important cities of France was proposed, and it was calculated that

(1) See p. 34 *Bulletin* Nov. 1910, Abstr. 767 *Bulletin* March 1911, Abstr. 1393 *Bulletin*, May 1911.

by such method a million cubic meters of gas and 170,000 kg. of sulphate of ammonia could be obtained daily representing a sum of 200,000 francs.

3126 HJALMAR VON FEILITZEN and IVAN LUGNER. **New Researches on the Hygroscopicity of Certain Nitrogenous Fertilisers.** (Weitere Untersuchungen über die Hygroskopizität einiger neuerer Stickstoffdüngermittel).—*Chemiker Zeitung.* Cöthen, 9 September, 1911.

Sweden

The Experiment Station of the Swedish Association at Jönkoping for Moor cultivation publishes a short report on the researches made with the view of determining the hygroscopicity of certain nitrogenous fertilisers.

The experimeuts lasted a month; during this time the Petri dishes which were used for the purpose, were weighed several times.

The variations of the weights are given in the following table:

	A In dry air; (total decrease of weight during 30 days) gr:	B In damp air; (total increase of weight during 30 days) gr:
Nitrate of soda	— 0.0054	+ 1.9082
Nitrate of lime	+ 0.8390	+ 7.4737
Nitrate and nitrite of soda	+ 0.1539	+ 11.5523
Cyanamide	+ 0.4406	1.8624
Mixture of cyanamide and of nitrate of lime 1:1	+ 1.9969	+ 6.6984
Mixture of cyanamide and of nitrate of lime 2:1	+ 2.0416	+ 15.8836
Sulphate of ammonia	— 0.2929	+ 3.9310

The mixtures were prepared by the Norwegian Joint Stock Company for Electro-chemical Industry.

Unfortunately the ratio of the two mixtnres was not so exact as could be wished, and analysis showed moreover that the mixtures had not been prepared with due care.

In order to determine more exactly the content of the mixtures, the writer carried out another set of experiments with nitrate of soda, cyanamide and two mixtures prepared by himself; the results have now been published.

The figures given, and especially the diagrams fully confirm the results previously obtained.

It would seem that as regards the reduction of the hygroscoplcity of nitrate of lime by mixing it with cyanamide, the Norwegian Society has not had its hopes fulfilled.

It is however possible that the fertiliser may be more easily dealt with and applied, if care be taken to apply it immediately after mixing.

The object of the experiments in cultivation undertaken by the Experiment Station of the Swedish Moor-culture Association at Jönkoping was to determine the relation existing between the fertilising action of the mixture and that of its components.

KARL F. KELLERMAN. **Nitrogen-Gathering Plants.** — From *The Yearbook of the U. S. Dep. of Agr.* for 1910; pp. 213-217. With 8 plates. Separate 530. Washington 1911. **3127**

It is a well known fact that the Leguminosae that bear symbiotic bacterial nodules upon their roots, fix and utilize as food the nitrogen of the air. It is less generally known that certain other plants, entirely distinct from Leguminosae also bear symbiotic bacterial root nodules and have nitrogen-gathering properties.

From our present knowledge it seems safe to assume that a few species of bacteria, and perhaps a few species of fungi and algae, are the only plants which have the power to fix atmospheric or gaseous nitrogen and make it available for plant food for the higher plants. **United States**

All of these microscopic plants are undoubtedly of economic importance, although it is probable that the three types which excel in nitrogen-fixing ability are the species of *clostridium* which fix nitrogen when given the proper food, and deprived of oxygen, the species of *Azotobacter*, which fix nitrogen when supplied with oxygen as well as suitable food; and the bacteria of the symbiotic root nodules which usually have a slight power of fixing nitrogen when supplied with oxygen and suitable food, but which reach their greatest effectiveness in manufacturing plant food from the nitrogen of the air when growing in the nodules on the roots of higher plants.

The writer makes a comparison and illustrates in 8 plates the nitrogen-fixing nodules found upon the roots of different plants : red clover, crimson clover, alsike clover, alfalfa, Canada field-pea, garden-pea, vetch, *Acacia dealbata*, *Acacia Esterhazia*, *Acacia latifolia*, *cowpea*, Lima-bean, lupine, " Mung bean ,, Velvet bean, alder, New Jersey tea, Buffalo-berry, Silver-berry, Mountain balm, *Encephal-*

artos Villosus, *Cycas circinalis*, *Cycas seemanni*, *Encephalartos horridus* etc.

The alder, New Jersey tea, silver berry, buffalo berry and sweet fern among the non-legumes, and numerous native and ordinarily unoticed legumes, belonging to the genera Kuhinstra, Psoralea, Genista, Baptisia, Melilotus, Amorpha, etc. occur throughout wide areas in the United States, and with little trouble could be extended over much of the unused land. In the writer's opinion this is one of the simple and inexpensive, but none the less valuable, possibilities for the conservation and enhancement of the agricultural resources of the country.

3128 F. Pilz. **The Cultivation of Leguminosae and Gramineae separately or together with special reference to Nitrogen Supply.** (Leguminosen und Gramineen in Rein-und Mengsaaten mit besonderer Berücksichtigung der Stickstoffausnutzung). — *Zeitschrift für das Landwirtschaftliche Versuchswesen in Oesterreich*, XIV. J., H. 10, P. 1150-1210, Abb. 18. Wien, Oktober 1910.

The writer's aim is to find out whether the favourable effect exercised by the *Leguminosae* on the *Gramineae* which follow them in rotation, can also be exercised, to a certain extent, by cultivating them together; in other words, whether the *Gramineae* can immediately utilise the nitrogen fixed by the *Leguminosae*. **Austria**

There were twe series of experiments.

The first was in pots, with barley, oats, peas, and vetches separately; and peas and barley, vetches and oats, respectively together. In this series, some pots were left without any fertiliser, others were treated with a mineral fertiliser (phosphatic and potassic); others again with a complete fertiliser (phosphatic, potassic, and nitrogenous).

The second series was made in open ground, and in conditions as far as possible like those of practical agriculture.

In this series the plants were grown separately and together as before.

The plants were sown as follows:

Group	I. —	Minimum	quantity of	*Gramineae*
		»	»	» *Leguminosae*
»	II. —	»	»	» *Gramineae*
		Maximum	»	» *Leguminosae*
»	III. —	»	»	» *Gramineae*
		Minimum	»	» *Leguminosae*
»	IV. —	Maximum	»	» *Gramineae*
		»	»	» *Leguminosae*

The *Gramineae* used were barley, oats, and maize: the *Leguminosae* were peas, vetches, and beans. Each group was divided into the following plots: unmanured; nitrogen only; potash only; phosphates only; unmanured; complete manure; phosphate and potash; potash and nitrogen; phosphates and nitrogen; unmanured.

Some experiments were also made in solutions, but without convincing results.

The most important conclusions are summed up in the following table, where the data stand in proportion to 1000 sq. cm. of soil surface:

Group	Dry Matter in gr.		Nitrogen in mg.	
	Plants separate Gram + Leg. = tot.	Plants together	Plants separate Gram. + Leg. = tot.	Plants together
I	16.2+13.7=29.9	18.5×2=37.0	386.7+451.2=837.9	484.2×2= 968.4
II	16.2+16.1=32.3	19.0×2=38.0	386.7+480.3=867.0	500.7×2=1001.4
III	18.5+13.7=32.2	20.7×2=41.4	371.6+457.2=822.8	540.8×2=1081.6
IV	18.5+16.1=34.6	20.8×2=41.6	371.6+480.3=851.9	532.7×2=1065.4

From these general results, with some other particular ones, the following practical conclusions can be drawn:

1. The yield in dry matter is greater per unit of surface for the mixed crop than for the sum of the two separate crops. On the other hand it is less per weight of seed sown.

The yield in dry matter of the mixed crop is less influenced by manuring than that of the separate crops.

The proportion of leguminons plants to cereals in the growing crop is subject to variation owing to local conditions.

2. *Nitrogen content of the crops.* — In general in the mixed crop the legumin us plants are poorer in nitrogen, and the cereals richer. The leguminous plants only show an increase in nitrogen when they make a poor growth on soil with a sufficient supply of nitrates.

The increased nitrogen-content of the cereals grown with pulse is due, not to the presence of these, but to the diminished development of the cereals themselves,

The diminished nitrogen-content of the leguminous plants grown with the cereals is due to the diminished development of their above-ground parts.

All manuring has more influence on nitrogen-content in cereals than in leguminous crops.

3. The total yield of nitrogen per unit of surface is greater in the mixed crops than in the corresponding separate ones. The latter utilize the manure better.

The pot-experiments were carried out at the Kornenburg School of Vine-growing, the field experiments on the experimental farm of the Vienna Agricultural College at Grossenzersdorf, as well as at Kornenburg.

3129 **Investigation of Potash Deposits in the United States.** (1) — *California Cultivator;* Los Angeles Cal. September 14, 1911.

An investigation into possible sources of potash salts in the United States is being made this year by the United States Geological Survey, under an appropriation by Congress of $ 20 000 for the current year.

United States One of the possible sources from which potash may be derived is in association with saline deposits left by the drying up of large bodies of salty waters, such as are known to have existed at one time in many of the now desert areas of southwest Oregon, Nevada, south east California, Utah and elsewhere. It is hoped that by testing these saline deposits some may be found sufficiently rich in potash to have a commercial value, and that there may even be located some large and important deposits.

As a part of this work the survey will soon fit up a temporary laboratory at Gallon Nev. for the purpose of testing samples of salines from the Great Basin or desert areas. Samples of such alkaline salts will be tested at this laboratory free of charge, if a definite statement of the locality from which they were obtained be sent with the samples. If so requested, at the time that a sample is submitted for test, the accompanying information concerning the locality of the deposit will be treated as confidential; and the evidence thus obtained is not to be used for the purpose of making land withdrawals.

3130 E. B. HART & W. H. PETERSON. **The Sulphur Requirements of Farm Crops in Relation to the Soil and Air Supply.** — *The Journal of the American Chemical Society,* Vol. XXXIII, No. 4, p. 563-564. Easton, Pa. April, 1911.

United States The sulphur content of a number of our common farm products has been determined, and in agreement with other investigations

(1) See Abstr. 2095. *Bulletin.* July, 1911.

the quantity is much larger than found by Wolff in the ash from such products.

The amount of sulphur trioxide removed by crops is considerable, being equal in the case of average crops of cereal grains and straws to about two-thirds of the phosphorus pentoxide removed by these crops; the grasses of mixed meadow hay remove quite as much sulphur as phosphorus, while the legume hays may approach, and in the case of alfalfa, even exceed in this respect. Members of the *Cruciferae*, as the cabbage and turnip, are heavy sulphur-using crops and may remove two to three times as much sulphur trioxide as phosphorus pentoxide. An average acre crop of cabbage will remove about 100 pounds of sulphur trioxide.

Normal soils are relatively poor in total sulphur trioxide; a limited number of analyses showed a percentage content of from 0.033 to 0.140; most of them contained less than 0.10. An acre foot will contain from 1 000 to 3 000 pounds of total sulphur trioxide. About the same quantity of phosphorus pentoxide will be found in an acre foot of normal soil. These results for sulphur trioxide are based on analyses made by the method of fusion with sodium peroxide. Determinations by extracting with hydrochloric acid or with nitric acid and bromine will not give the total sulphur content of soils.

Soils cropped for 50-60 years, and either unmanured or receiving but slight applications during that period, have lost on the average 40 per cent. of the sulphur trioxide originally present, as determined by comparison with virgin soils.

Where farm manure has been applied in regular and fairly liberal quantities the sulphur content of the soil has been maintained and even increased.

The total sulphur trioxide precipitated at Madison, Wis., with the rain, amounted in the five months of June to October, 1910, inclusive, to 11.7 pounds per acre. The annual amount may tentatively be placed at 15-20 pounds.

The losses of sulphur trioxide by drainage, based on the analysis of the drainage waters at Rothamsted, England, and on a yearly drainage of 10 inches, would amount to about 50 pounds per acre yearly.

Even with much less loss by drainage, it does not appear that the atmosphere can serve as a complete compensating factor for losses of sulphur trioxide, which soils sustain through both cropping and drainage. The partial depletion of the sulphur of the soil by continued cropping without fertilization is evidence in support of this view.

From the data here presented it appears that for permanent and increased production of farm crops such systems of fertilization must be inaugurated as will supply to the soil from time to time, in addition to the elements now recognized as necessary, a sufficient quantity of sulphur to meet the losses sustained by cropping and drainage.

Such sources of sulphur are farm manures; the trade fertilizers, such as superphosphate, ammonium sulphate and sulphate of potassium; and the so-called soil stimulant, gypsum or calcium sulphate.

No attention, so far as we are aware, has been directed to this problem in America. It is hoped that the thesis here presented may be made the subject for further research by chemists and agriculturists, and the relative importance and necessity for sulphur in systems of fertilization finally established.

3131 M. P. DE SORNAY. **Determination of the Amount of Sulphuric Acid in Soils.** (Dosage de l' acide sulfurique dans les sols). — *Bull. de l'Assoc. des Chimistes de sucrerie et de Distillerie de France et des Colonies.* T. XXIX, N. 3, pp. 133-136. Paris, Septembre 1911.

Attention is first drawn to the fact that, though (especially for the sugar-cane) the presence of sulphuric acid in the soil is necessary, some uncertainty prevails as to the amount required.

Mauritius Mr. de Sornay affirms, as a result of his researches, on the soils of Mauritius, that the usual method for determining the amount of the sulphuric acid content, by means of treatment with nitric acid and barium nitrate is inadequate.

In all soil analyses, it is recommended that the amount of sulphuric acid should be estimated by treatment with hydrochloric acid, although, in certain cases, the whole of the sulphates may not be dissolved on account of the large proportion of iron and alumina present.

The method advised is as follows:

Treat with potassium nitrate (10 gr. of soil + 1 gr. nitrate of potassium and 5 cc. of water), dry in a sand bath, calcine, then treat with 25 cc. of hydrochloric acid, dry in the sand bath until complete desiccation is attained, in order to render the silica insoluble. Repeat with 20 cc. hydrochloric acid and 5 cc. of water, heat well in the sand bath (not allowing it to get dry again) for 30-45 minutes, filter, wash with water up to the extent of 100 to 125 cc., add the barium chloride, heat and concentrate a little to facilitate precipitation.

Continue the determination as usual.

Liming of Arable Land (1). (*West of Scot. Agric. Coll. Bull.* 55). — *The Journal of the Board of Agriculture*, Vol. XVIII, No. 6, pp. 502-503. London, September 1911. 3132

The effect of the application of lime in large amounts at long intervals of time has been compared with the effect of small and frequent dressings. The experiment was carried out from 1902 to 1909 on a light, loamy soil poor in lime, but in excellent physical condition. Four plots of 40 acres each in size were treated with 4 tons of lime per acre, applied in one, two, four, and eight dressings of 4 tons, 2 tons, 1 ton, and ½ ton respectively, the first dressing being given in the winter of 1901-2, and the subsequent dressings, if any, in each succeeding winter. In addition, one plot was treated with 5 cwt. lime in each of the eight years, and the effect of the application of 4 tons gas lime in one amount was tested on another plot. The rotation during the eight years was as follows: turnips, barley, seeds hay, oats, potatoes, wheat, seeds hay, and oats. Great Britain: Scotland

The conclusions drawn from this experiment may be summarised as follows:

Large dressings of not less than 4 tons per acre applied at long intervals of time are much less effective in producing an increased yield of crops than the same quantity of lime applied more frequently in divided doses, and on such soils as that on which these experiments were conducted they are not likely to prove profitable. The largest increases were obtained in this experiment from annual applications of 10 cwt. burnt lime per acre. Applications of 5 and of 10 cwt. per acre per annum gave profitable results, but the larger dressings of 1, 2, and 4 tons per acre proved very unprofitable

The direct application of lime to the turnip crop produced a large increase in the yield, and the larger the quantity of lime given, up to 4 tons per acre, the greater was the increase. A dressing of 10 cwt. per acre proved, however, most profitable.

On the hay crop lime applied to the previous crops was beneficial, but lime applied on the young seeds tended to diminish the yield of hay, except when given in small quantity. Liming exercised a beneficial effect on all the cereal crops, but on the potato crop the effect of liming was invariably injurious.

Gas lime applied at the rate of 4 tons per acre to the turnip crop produced a considerably smaller increase than an equal weight of burnt lime, but in the seven succeeding years of the rotation its action was much more beneficial to the crops.

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(1) Cf. *The Science and Practice of Farming during 1910 in Great Britain*, pp. 210-211; Abstr. 1144, *Bull.* April 1911 [*Ed.*].

3133 **An all-American Fertilizer.** — *The Engineering and Mining Journal*, Vol. 92, No. 11, p. 483. New York, Sept. 9, 1911.

United States

The field force of the U. S. Geological Survey is searching for deposits of minerals which shall furnish the three necessary elements that are contained in a complete fertilizer, namely, phosphate rock, nitrate salts, and potash salts. The survey has already discovered and surveyed enormous deposits of phosphate rock, and 2,398,590 acres of phosphoric land, withdrawn at the recommendation of the Geological Survey, are now waiting legislation by Congress to allow of their development.

In order, however, to ensure an all-American fertilizer, regardless of importations from other countries, it remains to discover deposits of nitrate of soda and potash salts ; as both of these minerals are readily soluble and are not found as outcrops, this is not easy. Nevertheless, it is believed that the geological conditions prevailing throughout a large portion of the arid West favored the accumulation, during the earlier periods, of both o these salts, and hardly anything could be suggested which would be of greater assistance to the American farmer than the discovery of commercial deposits of either of these necessary fertilizing minerals.

3134 H. KASERER. **Preparation of the Soil without Ploughing** (Ein Versuch der Bodenbearbeitung ohne Pflug. Arbeiten der landwirtschaftlichen Laboratorien und der KK. Hochschule für Bodenkultur in Wien. Aus dem Institut für Pflanzenproduktionslehre). — *Zeitschrift für das Landwirtschaftliche Versuchswesen in Oesterreich*, Jahrg. XIV, Heft 9, pp. 1123-1131. + tbl. IV. Wien, September 1911.

Austria

The writer has made a series of experiments to compare plots of land ploughed with others only worked by means of a horse-hoe.

Also the first year each plot was worked by a cultivator, and then harrowed and rolled.

The soil was sandy calcareous loam, poor in humus, and very liable to pan.

The following average figures show the results:

	Amount per ha. Dry Matter qls.			
	Grain		Straw	
	horse-hoed	ploughed	horse-hoed	ploughed
Spring barley	16.3	16.6	17.0	17.6
Winter wheat	17.6	18.1	38.6	43.7
		horse-hoed	ploughed	
Green maize		73.5	83.4	

	Total Nitrogèu kg. horse-hoed	ploughed
Spring barley	30.80	30.79
Winter wheat	49.06	59.87
Green maize	64.52	75.60

These results demonstrate the advantage of ploughing to fix the nitrogen. Nevertheless the small differences obtained make it possible to hope that ploughing may be reduced, and consequently also traction and manual labour, which become every day more costly.

Explosives in Agriculture. — *Nature*, Vol. 87, No. 2189, p. 496. London, 12 October, 1911. **3135**

A number of new uses of explosives in agriculture are described by Mr. F. H. Gunsolus in the *Journal of the Franklin Institute* for August. In the North-Western Pacific States dynamite is largely used for clearing land of tree-stumps ; but a more novel application is to drill holes from 2 to 5 feet into the soil and to explode dynamite cartridges in them, in order to break up and loosen the subsoil. This process may be carried out on land where orchards have already been planted, the quantity of dynamite used varying from 25 to 100 lb. per acre. Explosives are also being used very largely in the Western States for digging ditches, especially in swampy clay ground. Slanting holes are punched at intervals of about 2 feet along the line of the proposed ditch ; the middle hole is loaded with two or three cartridges, the explosion of which serves to detonate the charges in the other holes, with the result that a mile or more of ditch may be blasted simultaneously. The earth from the ditch is scattered evenly over the adjoining land, and the presence of stumps, trees, and underbrush interferes scarcely at all with the success of the operation. **United States**

First Experiments in Dry Farming (1) **in Algeria.** (Premiers Essais de " Dry Farming " en Algérie). *Bull. de l'Office du Gouvernement Général de l'Algérie.* — No. 20, pp. 308-310. Paris, 15 Oct. 1911. **3136**

Experiments in Dry Farming have been undertaken in the different districts of Algeria, both by the colonists themselves, and also by Agricultural Colleges and Associations. **Algeria**

(1) Cf. *Bull.*, Dec. 1910, p. 234 ; Abstracts 82-85 and 87, *Bull.* Jan. 1911; Abstract 423, *Bull.* Feb. 1911; Abstracts 782-786, *Bull.* March. 1911; Abstracts 1396 and 1397 *Bull.* May 1911; Abstracts 1705 and 1706, *Bull.* June 1911. [*Ed.*].

It is therefore possible to prove whether the new methods are as satisfactory in practice as they appeared to be in theory.

At Tixter (Hauts Plateaux Sétifiens) plots of wheat which have been dry-farmed, have, this year, shown great powers of resistance to the scirocco, which damaged all the cereals in Algeria. The above-mentioned wheat yielded about 20 quintals per hectare (16 cwt. per acre) while the crop from the remainder of the field only amounted to 10 quintals per hectare (8 cwt. per acre).

On a private estate, thanks to crosskillage in March and April, the wheat also resisted the scirocco which wrought much damage in other fields.

Dry farming is therefore a guarantee against scorching, and if it had been practised on all the corn-land, Algeria would not have lost ten thousand millions of quintals of cereals through the scirocco.

Field Crops — Industrial Crops — Horticulture Fruit-Growing.

3137 **Cultivation of Rice in the Agricultural Station of Kitobola - Lower Congo.** — *Bull. agricole du Congo Belge.* Vol. II, N. 3, pp. 455-464. Bruxelles, Septembre 1911.

Rice has been cultivated since 1904 at the Agricultural Station of Kitobola, situated in the valley of Lukunga at the foot of Bangu mountain (Lower Congo). The rice plantations are on flat ground (loams) along the Lukunga, about 300 meters (327 yards) wide.

Belgian Congo

Two or three times a year the river submerges the valley during one or two days. In 1906, 19 t. (18.7 tons) were grown on about 6 ha. (14.8 acres); in 1907, 44 t. (43.3 tons) on 21 ha. (52 ac.); in 1908, 49 t. (48.2 tons) on 65 ha. (160.5 acres); in 1909, 133 t. (130. 8 tons) on 47 ha. (116 acres); in 1910, 135.5 t. (133.3 tons) on 84 ha. (207 acres), and in 1911, 120 t. (118 tons) on 84 ha. (207 acres). The production is thus rather irregular.

At the beginning the mountain rice (*Oryza montana*) was cultivated only. Later on different varieties of swamp rice, especially those from Piedmont and Java, were introduced when the first terraces of irrigation were established.

Different projects for irrigating large extensions of land in Kitobola were drawn up, but have not yet been completed.

The author believes that the soil and the climate of Kitobola are very favourable to the cultivation of rice (1).

Future of the Manchurian Bean Trade. — *The Journal of the Board of Agriculture*, Vol. XVIII, No. 6, p. 518-519. London, September, 1911. **8138**

The question of the probable future output of soy beans from Manchuria is of importance in view of the demand for these beans in Europe and in North America.

A report of the Imperial Maritime Customs of China (II Special Series, No. 31) in this connection states that it is doubtful whether the cultivation will extend much in the districts where the bean is already grown on a large scale (*i. e.* Southern Manchuria), as it is too much to hope that the beans will supplant the other crops, such as millet and kaoliang, as far as the conservative Chinese peasant is concerned. **China: Manchuria**

It is in the northern and western districts of Manchuria that the possibility of extension lies, *i.e.* the districts beyond Petuna, up the Hulan valley, and towards Mergen. The construction of a railway to this vast region is contemplated, and the land is mainly virgin soil, extremely fertile, which offers excellent inducements to immigrants who are now entering Manchuria in greater numbers than formerly, owing to the removal of the Government restrictions.

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(1) The average production of Rice (unhusked) in Italy from 1895 to 1899 was hl. 35.3 per ha, 39.18 bushels per acre; in Japan from 1894 to 1898, hl. 25.8 (28.63).

In Italy a good rice field produces from 50 to 70 hl. of paddy per ha (55.5 to 77.7 bushels per acre); an average field produces from 40 to 50 (44.4 to 55.5), and a poor one from 30 to 40 (33.3 to 44.4). (Compare ITALO GIGLIOLI. *Malessere agrario ed alimentario in Italia*, pp. 224-226).

In Europe the production of unhusked rice ranges from 30 to 40 hl. per ha., 33.3 to 44.4 bushels per acre; in Carolina from 50 to 60 hl., 55.5 to 66.6 bus., as an average. A hl. of paddy rice weighs from 45 to 60 kg. (39.6 to 48 lbs per bus.). (Compare BARRAL-SAGNIER, *Dictionnaire d'Agriculture*, Vol. IV, p. 487. Paris, 1892). (*Ed.*).

A promising feature of this extension of the area in a northerly direction is that, at present, the further north the beans are grown the better in quality do they become. The best reports have, in fact been received of beans grown far above Harbin. It is true that in the districts which lie far north there is always a risk of early frosts descending upon the harvests; but this danger could be averted by cultivating specially selected varieties which mature in the shortest possible period.

Much remains to be effected in the way of improvement of commercial arrangements in connection with the dispatch of the beans at the Manchurian ports.

3139 J. H. HAMPTON. **Second Report on Experiments. Botanical Experiment Station, Salisbury, 1910-11.** — *The Rhodesia Agricultural Journal*, Vol. VIII. No. 6, p. 853. Salisbury, Rhodesia, August, 1911.

The following are some of the experiments carried out at the Botanical Experiment Station at Salisbury, during the season 1910-11.

The crops were grown without manure or irrigation.

Egyptian Clover (*Trifolium alexandrinum*) (1). Owing to the promising results obtained from this crop on new land during the season 1909-10, a further trial was made this year on land which Rhodesia carried vetches last season. The seed was sown broadcast on the 15th December, at the rate of 20 lbs. per acre. This seeding appears to be too light, as the crop came up very thinly. Germination, however, was good, and the growth rapid. On the 15th March the crop came into flower, and was cut for hay on the 25th of the same month. When dried and baled the weight of first class fodder from the quarter acre plot was 225 lbs. or a yield of 900 lbs. per acre. Two days after cutting the aftermath began to show, and at the present time (July 4th), the clover stands about 15 ins. high, and is being cut for seed in order to obtain some acclimatised seed for sowing next season. The hay resulting from this second crop should weigh about 250 lbs., so that for the season a yield of about 1 ton of cured hay per acre has resulted. The Egyptian clover, however, has not done so well as last season, yet a heavier sowing would have no doubt produced a better yield, and the crop seems undoubtedly suited to the country. The fodder is also of higher feeding value and market worth than oat forage, and, in addition, the aftermath provides excellent late summer feeding for sheep and cattle.

(1) Cf. *Bull.* Nov. 1910, p. 61; Abstr. 812, *Bull.* March 1911. (*Ed.*).

Cowpeas (*Vigna Catjang*) (1). Five different varieties of cowpeas were tested on new ground, but only two of these "Black-eyed Susan" and "Iron Cowpea" gave satisfactory results. The other varieties "Mixed Clay", "Wip-o'-Will," and "Wonderful Cowpea," were attacked in the early stages of growth by a green aphis and never really recovered, their leaves retaining a mouldy appearance up to the time of reaping. All the varieties suffered from the attacks of the common "black and red beetles," *Mylabris oculata*, which are always so destructive amongst leguminous crops. It is a matter of interest that whereas the velvet beans (*Mucuna utilis*) made a more vigorous growth than the cowpeas the former produced none of the nitro bacteria nodules, which were found in large numbers on the roots of the latter. However, the velvet beans suffered from none of the pests which attacked the cowpeas.

Comparing the results obtained from the two crops — velvet beans and cowpeas—the preference must be given to the former, both as regards yield and feeding qualities. The mouldiness of the leaves of the cowpeas due to the attacks of the aphis renders the crop less appetising to animals than it otherwise would be. The value of velvet beans as a fodder was shown last year in the fact that the cattle at the Experimental Farm, Gwibo, refused to touch "Boer manna" (*Setaria italica*) hay, "Teff grass" (*Eragrostis abyssinica*) hay or Veld-grass hay, so long as the velvet bean hay was available.

"Boer Manna" (*Setaria italica*), "Japanese Millet" (*Panicum crusgalli*), "Hungarian Millet" (*Setaria germanica*), "Californian Green Moha" (*Setaria italica*).

A comparative trial of these four millets was made on new land. The 'Boer Manna" and "Californian Green Moha" occupied half-acre plots, whilst quarter-acre plots were sown to the remianing two. The seed of all was sown broadcast on the 29th December at the rate of 17 lbs. per acre. A fairly good germination followed as the weather conditions proved favourable, but the seeding was too thick. On the 20th March, or rather less than three months from time of

(1) In the United States the cowpea is extensively grown in the Southern States as a hay crop. It is also invaluable as a green manure crop. It is to the South what clover is to the North and alfalfa is to the West. From 3 to 5 pecks of seed are used per acre. See: *Cowpeas, Farmer's Bull.* 89, *U. S. Dept. of Agric.* by JARAD G. SMITH. As long ago as 1855 an excellent essay on Cowpeas was written by EDMUND RUFFIN (*Essays and Notes on Agriculture.* Richmond, 1855).

Cf. L. H. BAILEY. *Cyclopedia of American Horticulture.* London-New York. (*Ed.*)-

sowing, the "Japanese millet," "Hungarian millet" and "Californian green moha" were ready for reaping; the "Boer manna," however, was not cut until the middle of April. The yield per acre of cured hay from the "Boer manna" was 3,190 lbs., or 1 ½ tons; form the ,, Hungarian millet," 1,040 lbs., or ½ ton; from the "Japanese millet," 1,236 lbs. or 3-5ths ton; and from the "Californian green moha," 2,100 lbs. or 1 ton.

As far as yield goes, the results are all in favour of "Boer manna," so that farmers should pay greater attention to this crop, particularly as its beneficial effect in rotation with maize has been recognised for a long time. There is also a good market in Rhodesia for "Boer manna" seed.

"Japanese millet" is not suited to red soil, but grows well on wet ill-drained land, and in soil of this nature would produce a valuable rotation crop to maize. It has the advantage over "Boer manna" in that it does not suffer from rust, which has a slightly injurious affect on the fodder of the latter.

Teosinte. (1). — A trial was given last season to *Teosinte* on new ground, but owing to bad germination the crop was not so successful as was expected. During the past season a further trial was made on the same land as last year. After soaking for 48 hours, in order to assist germination, the seed was sown on the 5th December in rows 4ft. apart, a few grains of the seed being dropped at intervals of 2 ½ ft. The germination wes only moderate, but the growth after the crop had established itself was rapid and robust. There were a few blanks, but the crop made such good growth that by the middle of March it had reached an average height of about five feet and had covered the ground so well that the blanks were hardly noticeable. The crop was cut on the 2nd. June, and made excellent silage when mixed with mealie stalks and cowpeas. The weight of green fodder from the ¼ acre plot was 5,000 lbs. making a yield of 10 tons per acre. « Stalk borer », which is very prevalent on the Experiment Station, caused a good deal of damage during the latter stages of growth.

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(1) Cf. Abstr. 43, *Bull.* January 1911; Abstr. 2567, *Bull.* Aug.-Sept.-Oct. 1911. (*Ed.*).

Influence of Italian Rye-grass on other Grasses and on Clovers. 3140
(*N. of Scotland Agric. Coll., Trans. of Students' Assoc.* 1910). — *The Journal of the Board of Agriculture*, Vol. XVIII, No. 6, pp. 503-504. London, September, 1911.

Great Britain: Scotland

One of the members of the Association experienced great difficulty in getting clover to grow, and as the seed mixture used included a considerable quantity of Italian rye-grass, an experiment was arranged to test the effect on clover of substituting perennial for Italian rye-grass, and also to test the effect of manure. Five different mixtures were sown in the spring of 1909, along with an oat crop on a clay soil. Each mixture contained 6 lb. cocksfoot, 3 lb. timothy, 3lb. red clover, and 3 lb. white clover, and the rye-grasses in the following quantities:

	1 lb.	2 lb.	3 lb.	4 lb.	5 lb.
Perennial Rye-grass	20	15	10	5	0
Italian Rye-grass	0	5	10	15	20

It wil be seen that perennial rye-grass was substituted for Italian rye-grass. In February, 1910, moss-dung litter at the rate of 15 tons per acre was applied to part of each plot. After cutting, samples of the hay of each plot were taken, the grasses and clovers separated out and weighed and the percentage of each calculated. From these the weights in cwts. per acre of grasses and clovers were estimated, and are shown in the following table

With dung:

	1 Cwt.	2 Cwt.	3 Cwt.	4 Cwt.	5 Cwt.
Grasses	37	39	37	37	38
Clovers	23	19	13	10	7
Total	60	58	50	47	45

Without dung:

Grasses	18	19	24	21	27
Clovers	26	21	15	12	11
Total	44	40	39	33	38

It will be seen that as the proportion of Italian rye-grass in the mixtures increased, so the proportion of clover in the crop decreased. This was the case both with and without manure, though in every case the effect of the dung was slightly to reduce the clover and to increase the grasses. The Italian rye-grass also appeared to have a similar effect on cocksfoot and timothy as on the clover, the quantity diminishing with the increased use of the Italian seed.

3141 R. T. H. **The Heating and Firing of Hay. Agricultural Bacteriology.** (*Handbuch der landwirtschaftlichen Bakteriologie* By Dr. F. Löhnis. Pp. xii + 907. Berlin: Gebrüder Borntraeger, 1910). — *Nature*, Vol. 87, No. 2180, p. 481. London, October 12, 1911.

That we have much yet to learn concerning many of the natural processes involved is apparent from a perusal of such a section as that on the heating and firing of hay. This appears to take place in three stages, a first in which the temperature rises to 45-50° C., Germany a second in which the temperature rises from 50° C. to 70° C., and a third which proceeds above 70° C. The first two stages are caused by the activities of micro-organisms invoving processes of decomposition and oxidation (" thermophilic " bacteria being active between 50° and 70° C.), but the cause in the third stage of the production of heat above 70° C. and ultimately culminating in ignition is not so obvious. It is probably a physico-chemical process due to the production of carbonaceous and other matters which absorb, condense, and oxidise the hydrogen, marsh and other inflammable gases, which have resulted from decomposition in the earlier stages, and cause their ignition, much in the same way as spongy platinum causes the ignition of hydrogen.

3142 **Cotton Cultivation in Peru** (1). *The Board of Trade Journal*, No. 774, pp. 646-647. London, Sept. 28, 1911.

Peru is extremely well situated for the cultivation of cotton, as the climate is favourable, and there are neither violent thunder storms nor heavy rainfalls. There is a large amount of sunshine in summer, and the difference between the day and night temperatures at the beginning of autumn is favourable to the ripening of the bud. Moreover, the rivers which flow through the valleys provide excellent means of irrigation for keeping the soil in good condition. Peru

The salt air carried over the Peruvian coast lands by the frequent sea breezes is also beneficial for cotton growing, as a certain quantity of sodium chloride is good both for the soil and for the atmosphere. There is an abundance of light silicious soil near the coast of Peru, which is most suitable for the cotton plant. This kind of soil exists in the valleys of Tiwia, La Chira, Catacaos, Jechura, Lurin, Mala, Catiete, Ica, Talpa, Narca, Locumba, Moquegua.

(1) Cf. *Bull.* Dec. 1910, p. 252; Abstr. 1739, *Bull.* June 1911. (*Ed.*).

BRABANT AND NASLIN. **General Consideration on Cotton Cultivation in Tunis** (1). (Considérations Générales sur la Culture de Coton en Tunisie). *Bull. de la Direction Générale de l'Agriculture, du Commerce et de la Colonisation.* N. 58, Ier Trimestre, 1911, pp 66-73. Tunis. **3143**

Before organizing systematic experiments in cotton cultivation in Tunis, it would be well to consider what has already been accomplished in this direction in Algeria.

Cotton grows well, and can be cultivated economically, in nearly all the fertile parts of Tunis. North of the Medjerdah, irrigation is unnecessary in the rainy districts of Béja, Tabarca, Mateur, Bizerte etc. Further south, or in the drier districts, irrigation would probably be required, but discretion is necessary in the matter, as otherwise, the plants' vegetative development would be stimulated to the detriment of the fructification. Up to the present, three varieties have been tried and these satisfy all cultural and climatic requirements. **Tunis**

The two Egyptian varieties "Mit-Afifi" and "Yanovitch", grow best on the coast, while the American "Mississipi", which is strong and matures early, is better suited for the colder districts and those where the vegetative period is short. The three above-mentioned varieties are those preferred on the market and which have the readiest sale.

But it is still necessary to obtain a local variety, which is acclimatized, suited to the conditions obtaining, and unvarying. This will probably be effected in five or six years by means of selection.

A cooperative cotton society will then be required, which will superintend the ginning, baling, classification, transport and also the sale of the produce.

J. STEWART J. MC. CALL. **Exotic Cottons in Nyasaland**. *Nyasaland Protectorate: Department of Agriculture. Bulletin* No. 1 of 1911. Zomba. **3144**

The most difficult initial problem in establishing a native cotton industry is making the native understand why he should grow a crop not required for his own food. It is usually more easy to introduce cotton cultivation near a civilised centre where cloth can be obtained, as natives coming in daily contact with Europeans always **Nyasaland Protectorate**

(1) Cf. Abstract 1158, *Bull.* April 1911, and Abstract 2116, *Bull.* July 1911. (*Ed.*).

wear more clothes than those in outlying districts where clothing made from a skin or piece of beaten bark serves the purpose.

The experience of Nyasaland confines Egyptian cotton cultivation to elevations under 2000 feet and American from 2000 to 4000 feet.

It would be impossible to alter the social conditions of the American cotton belt and pay low wages as in Africa, but it is possible and practical to give African cotton-growing countries cheaper shipping facilities and to join the cotton fields with the coasts by means of navigable rivers or Government railways.

Judging by the many varieties of cotton grown in the new cotton fields of Africa it seems to be a difficult problem to decide what cotton is best to cultivate. This problem, as already suggested, must be decided by experiment; but in making the decision it is well to consider the market price of the more promising varieties experimented with, as a small crop of high quality may be of greater value than a larger crop of inferior staple.

Nyasaland very fortunately has already an excellent long staple cotton known in Manchester as " Nyasaland Upland " ; this cotton is excellent in character and better than any cotton of the type which has been grown in recent years from Upland seed.

In most new cotton fields there are two kinds of pests and diseases: indigenous insects and diseases, or those natural to the country; and exotic insects and diseases or those foreign to the country.

In 1901 the total export of cotton for the Protectorate was valued locally at £ 3; for the season 1904-05 as £ 5914; for 1907-08 £ 13999; for 1908-09 £ 28355; and for the eleven months of 1910-11 £ 52853.

3145 **Cotton Cultivation in the German Colonies** (1). (Deutsch-Kolonialer Baumwollbau). — *Deutsches Kolonialblatt*, No. 20, p. 763. Berlin, 15 October, 1911.

German Colonies

In Togo the government has made every effort to introduce cotton cultivation among the natives.

Experts were sent as instructors. This cultivation improves both in quality and quantity.

In Cameroon not only the Government but also many private persons takes a great interest in cotton cultivation.

(1) See Abstr. 452, *Bull.* Feb. 1911, Abstr. 1156, *Bull.* April 1911. (*Ed.*).

The Government has published different regulations for protecting the cotton cultivation against damages and for the purchase of seeds.

In East Africa (Ost Afrika) the demand of seeds increased from 3000 " zentner " to 6000 and 8000 " zentner " (the zentner is almost one cwt.).

In the vicinity of Lake Victoria the cultivation was doubled owing to the free distribution of seed, to the premiums that were given, to the exhibitions held and to the securities granted on the prices of sale.

The indigenous plantations occupy an area of 11,000 hectares (27,000 acres).

In the district of Dukoba and Rouanda cotton cultivation is rapidly extending.

VILLIERS (Brit. Consul at Stockholm). **Flax Cultivation in Sweden.** 3146
The Board of Trade Journal, No 779, p. 241. London, November 2, 1911.

The revival of the cultivation of flax in Sweden has lately attracted attention, and recent experiments tend to show that the climatic conditions of certain parts of Sweden are favourable to the production of flax of high quality. **Sweden**

The Swedish consumption of flax for spinning and also of flax seed is continually increasing, and it is hoped that the revival of the cultivation of flax will benefit Swedish industries generally. It is further stated that certain trials of cultivation and preparing flax have recently been carried out near Westarvitz on the initiative of a British firm in conjunction with the Export Association of Sweden.

I. H. BURKILL and R. S. FINLOW. ***Corchorus capsularis* var. *oocarpus*, a new Variety of the Common Jute Plant.** (*Asiatic Society of Bengal*, Calcutta, September 6, 1911). Abs : *Nature*, Vol. 87, No. 2188, p.474. London, October 5, 1911. 3147

Corchorus capsularis, var. *oocarpus*, a variety distinguished by the elongation of its fruit, is a cultivated plant of south-eastern Mymensingh, Bengal (1). **British India: Bengal**

(1) There are about 36 species of the genus *Corchorus* distributed throughout the tropics, of which India posseses *C. acutangulus*, *C. Antichorus*, *C. capsularis*, *C. trilocularis*. These plants are met with in Asia, Africa

3148 WILHELM STEPHANI. **Reducing and non-reducing Sugars in Mangolds during Growth and in Store.** (Untersuchung über reduzierenden und nicht reduzierenden Zucker in den Beta-Rüben während des Wachstums und der Lagerung). — *Kühn-Archiv*, Bd. I, pp. 107-182. Berlin, 1911.

Germany

I. — The formation of cane-sugar takes place in the leaves in mangolds, as in sugar-beets; the cane-sugar passes without inversion to the roots, where it is stored as the final product of reserve-material.

II. — During the first year's period of growth, the reducing-sugar content in mangolds is very low, 0.05 to 0.1 %, except in the case of certain varieties very rich in invert-sugar, in which it may rise to 0.5 %.

III. — The formation of cane-sugar from accumulated monosaccharides (reducing-sugars) seems to take place in only minute quantities in mangolds, or not at all.

IV. — Mangold varieties poor in sugar contain more reducing sugar than varieties rich in sugar, both when growing and in store.

V. — Polarization cannot be used for the exact determination of the feeding-value of stored mangolds, especially in the spring after warm weather has set in, and in the case of heavy-croppers poor in sugar.

VI. — Under ordinary storage-conditions the percentage of reducing-sugar, in varieties of moderate sugar-content, does not exceed 1.0 till the weather turns warm. During this period and for varieties of high sugar-content, polarization gives results within a few units per cent. of those obtained by determination of the total quantities of sugars.

and America. It seems highly probable that hybrid or intermediate forms exist, connecting most of the Indian types. *C. capsularis* is a common plant throughout the hotter parts of India. The fibre (as that of all the other species of *Corchorus*) yields jute; the leaves are used (in India) medicinally; the seed yields an oil chiefly used for lighting purposes. (WATT, *Dictionary of the Economic Products of India*. London-Calcutta). (*Ed.*).

VII. — With mangolds rich in sugar and with sugar-beets, there is no difference between the polarization value of the cane-sugar and the value obtained by the determination of the total sugar; this is true even in the presence of 0.5-0.8 % of invert-sugar.

In certain cases (particularly with the mangolds of highest sugar-content) polarization gives a higher cane-sugar value than total determination. This may be explained by the fact that during storage highly dextro-rotary substances other than invert-sugar are formed; this is perhaps accompanied by further oxidations, with the formation of complex bodies derived from the reversion of monosaccharides, which by their dextro-rotary nature, give the polarizing action of invert-sugar. It is also possible that the mangolds use for respiration more of the levo-rotary sugar (fructose), in the newly-formed invert-sugar, than of the dextro-rotary (glucose), leaving an excess of the latter. This would readily explain the more freqnent occurrence of these substances in mangolds rich in sugar. In selecting stored beets for sugar-content, those with a greater power of inverting cane-sugar are rejected; while those which contain other dextro-rotary substances besides cane-sugar, or produce them during storage, are selected: the amount of these substances is, however, very limited.

VIII. — It follows that in selecting beets, and also mangolds, for sugar-content, reliance upon the polarization value is sound, provided the test is carried out before spring.

Although invert-sugar has a feeding-value at least equal to that of cane-sugar, it will be well, in selecting mangolds rich in sugar, to eliminate roots having a marked power of inverting cane-sugar, especially if the mangolds are required for winter storage; indeed, this power of inversion means a greater loss of sugar during storage. There is, however, no fear that selection on polarization value will give mangolds producing, besides cane-sugar, other dextro-rotary substances of no nutritive value.

The successes obtained with sugar-beets show conclusively that selection on polarization value increases almost exclusively the cane-sugar content; further, polarization value determined in spring indicates the capacity for keeping in store.

IX. — In the selection of heavy-cropping mangolds, which contain a great deal of water, polarization should be carried out in the autumn; for the heaviest croppers produce the largest amount

of invert-sugar when stored, and often give no polarization value, or even show a levo-rotary reaction; but they may yet contain a considerable quantity of sugar. As there is no simple and rapid method for the determination of total sugar, polarization must be used even for this class of mangolds. But if this method were used in spring the largest roots would be rejected as they are just the ones in which the formation of invert-sugar takes place most rapidly and to the greatest extent; selection in this way would have just the opposite tendency to what is required, as these roots, in spite of their loss of cane-sugar and low sugar-content, may still in spring contain the largest amount of total sugar per root, owing to their great size. For these mangolds, then, polarization must be carried out in autumn, as the most productive varieties are often used up before the spring, and the preservation of the cane-sugar is of little importance.

X. If the selection is based exclusively on total dry-matter, no better results will be obtained than by using the specific gravity, as in either case the salts and ash will influence the result. It would be better to use the organic dry-matter, so as to avoid selecting roots containing large quantities of salts, which are of doubtful value.

3149 **Java Cinchona**. *The Chemist and Druggist*, Vol. LXXIX, No. 1,652, p. 57. London, September 23, 1911.

In the cultivation of cinchona in Java, planters, as a general rule, adopt the practice of uprooting a definite proportion of their plantations each year, and replant the cleared area with new trees. Heer van Leersum, the Director of the Java Government cinchona undertakings, prefers the plan of thick planting and gradual elimination of poor and badly grown trees, with the ultimate formation of thinly populated plantations of finely grown old trees He has recently attempted to defend this plan on the ground of its greater financial advantage to planters, and has published the following figures of yield of bark for plantations of *Ledgeriana* trees varying in age from twenty-one to forty-four years:

Dutch East Indies: Java

YEAR	Yield of bark in ½ kilos	Number of trees	Quinine sulphate in bark %	Quinine sulphate per tree kilos	Total quinine sulphate (calculated kilos)
1895	8 008	82	7.06	3.44	282
1896	3 846	39	8.04	3.96	154
1897	4 172	42	7.79	3.86	162
1898	5 180	57	7.10	3.22	183
1899	7 028	70	7.18	3.60	252
1900	3 037	28	6.73	3.65	102
1901	3 207	30	5.97	3.20	96
1902	4 778	39	5.92	3.60	140
1903	11 900	99	5.56	3.34	330
1904	12 441	91	6.36	4.34	395
1905	12 059	88	6.53	4.24	373
1906	10 256	89	6.54	3.80	338
1907	7 197	56	6.87	4.40	246
1908	15 520	103	6.65	5 —	515
1909	12 343	78	6.79	5.37	419
1910	3 821	27	6.20	4.40	119
		1 018			4 106

These figures were published in "Teysmannia" early this year, and are supplemented by further data in the second quarterly report on the Government cinchona plantations for 1911, of which the following are samples. Nine bouws of *Ledgeriana* trees, thirty years old, gave on the average 850 kilograms of bark per bouw per year during 1896-1910, the yield in 1910 being 950 kilograms per bouw. Two bouws of *Ledgeriana* trees, twenty-five years old, furnished on the average 600 kilograms of bark per bouw per year during 1896-1910, the yield in 1910 being 1,080 kilograms per bouw (1 $^3/_4$ acre).

Heer van Leersum argues that in view of the great increase in yield of bark and quinine from older trees shown by these data his method of working is worth adopting generally. A correspon-

dent of the "Indische Mercuur," however, points out that if the whole of the trees referred to in the first set of figures had been uprooted in 1895, the bark sold, and the proceeds invested at 4 percent, the capital available at the present time from this transaction would be fl. 63,000 (1), whereas, on Heer van Leersum's figures, the sum realised is only fl. 51,720, or a loss of fl. 11 per tree; and if the method is persisted in for the whole of the Government undertakings, the loss amounts to about fl. 3,850,000. The ordinary planter expects a return of 10 per cent on his capital, and if this rate be assumed, the loss is, of course, proportionately greater.

Apart from the item refered to above, the second quarterly report contains little of interest. The weather was cold and wet, and labour was scarce and expensive, and both these factors have led to delays in harvesting and the performance of all plantation work, but fortunately little trouble has been experienced from diseases and insect pests. Several matters of minor interest in connection with cinchona were mentoned at the last meeting of the Preanner Bond. Further subscriptions have been received towards the prize for the best method of estimating quinine in bark, and it seems likely that the prize will be increased. Heer van Leersum mentioned that a new uprooting machine has been put on the market by Heer Bertling which is apparently giving good results The question as to whether the movement for raising the price of bark should be undertaken by a special association of planters or by an enlarged Preanger Bond was mooted, but no conclusion was arrived at. In this connection it is of interest to note that it is announced that, as no arrangement has been made with the Bandong factory, the whole of the Government bark, estimated at 1,000,000 kilograms, is to be sold in Holland this year, and is expected to bring 23 cents per kilo.

According to the report of the Garcet Cinchona Company for 1910, the low price prevailing for bark was a serious matter for planters. The average prices realised were 3 cents per unit for hybrid bark and 4.85 cents for Succirubra bark, the former with 6.12 per cent and the latter with 3 per cent quinine sulphate. The company had available 43,880 kilograms of bark, including 6,916 kilograms remaining from the previous year. They sold 40,856.8 kilograms of bark, realising fl. 14,170, from which fl. 1,748 has to be deducted for freight to Amsterdam and fl. 2,205 for insurance, sales expenses, etc. leaving fl. 10,142 as the net return. The company had a credit balance of fl. 94.05 at the end of 1908, and this was reduced to fl. 11.24 at the end of 1910.

(1) 12 florins = £. 1.

MACKIE (Brit. Cons. at Boma). **Cocoa Industry and Cotton and Coffee Growing in Congo State.** — *The Board of Trade Journal*, No. 773, pp. 593-594. London, Sept. 21, 1911. 3150

The experimental cultivation of cocoa has been in progress since 1908 at the post of Gauda-fundi in the Mayumbe, where some 300 acres have been planted. Within the last five years Mayumbe has become an active centre of the cocoa industry. The species of plant under cultivation has been introduced from San Thomé and Congo State is reported to be doing well, the exports having attained 769 metric tons in 1909 with a selling price at Antwerp of £56 to £76 a ton. With the northward advance of the Mayumbe railway, fresh fields for cocoa cultivation will be opened up in the Lower Congo, and a further expansion of this industry may be looked for. It is considered that the district of the Equator may be even better suited to the growth of cocoa than the Lower Congo. An important plantation has been started at Barumbu, near Coquilhatville, where some 92,000 trees are under cultivation, and experiments are being extended to the smaller plantations near the equator.

The Government coffee plantations cover an area of 1483 acres, and are situated principally in the Equator district. These plantations have been in existence for some years, but their output has diminished to such a degree that the Government were undecided whether or not to continue their maintenance, as well as that of the factory at Kinshasa for cleaning and drying the beans. Acting upon expert advice, the Government have now decided to continue the industry on improved lines, calculated to reduce the cost of transport and render the industry more productive. Instructions have been issued to replace the Siberian coffee under cultivation by an indigenous plant known as *Coffea robusta*, which grows luxuriantly at Sankuru, and has been successfully introduced into the British and Dutch Indian possessions.

The cultivation of cotton is still being continued by the natives, among whom seeds are being distributed by the Governement, together with directions for their guidance. The efforts of the Government have not been altogether unproductive of result, a small number of villages having profited by the new source of revenue offered to them. Further trials of this method of cultivation under Government aid are to be made in the Cataracts district, and it is thought that in course of time the natives will learn the advantages to be derived from the industry, which is at present, of course, merely in its initial stage of development. There are nevertheless thought to be indications that the industry, if conducted on a large scale,

might become a remunerative enterprise, and orders have accordingly been issued to the Goverment botanical stations in the Lower Congo to conduct experiments in cotton growing. For these experimental purposes seeds of the better-known American varieties are being imported.

3151 MAJMONE. **Early Tomato Growing near Naples.** (La coltivazione dei pomodori primaticci nei dintorni di Napoli).— *La Rivista Agraria*, No. 36, pp. 461-465. Napoli, 10 Settembre 1911.

Near Naples, the Palermo Tomato is used for growing for the early market. The tomatoes follow cauliflowers and fennel.

They are sown in nursery-beds in the autumn and planted out Italy in February and March; from 5000 to 6000 plants go to the hectare (2000 to 2400 to the acre).

In spite of the great amount of labour involved, especially in sheltering the plants with hurdles, the crop pays very well. The expenses per hectare come to nearly 2500 frs. (£40 per acre). Reckoning the June crop at 25 kg. (22 lbs. per ac.), the July-August crop at 200 kg. (180 lbs. per ac,), and the September crop at 100 kg. (90 lbs. per ac.), the net return will be nearly 700 fr. (£11 per acre).

The cultivation is very carefully attended to, but it is probable that the yield might be increased by the more extended use of chemical manures.

3152 HUGILL BARR. **Ginseng and its Culture.** — *The Canadian Horticulturist, Peterboro Canada.* Vol. 34, No. 10, October, 1911, pp. 238-239.

The variety of ginseng dealt with in this article is *Aralia quinquefolia,* which grows in rich, dry, shady woods in Canada.

A ginseng plantation should have rich, deep, alluvial soil, well Canada drained and in a position where the air, unhindered, circulates freely. The soil should be cultivated deeply and enriched as for onion growing.

Set the roots about eight inches apart each way, placing the roots two or three inches below the surface of the soil.

The bed should be provided with shade if not occupying a naturally shaded position. Exclude fowls, cats and other animals, except toads, with woven wire netting.

Avoid hoeing and remove weeds by hand pulling. In early spring, spray the bed with Bordeaux mixture.

In the autumn mulch the bed with clean, rich alluvial earth one inch deep.

The seeds when ripe in the autumn are bright red. These require a year and a half to germinate. They should be put in layers in moist sand for a year. When wanted for planting they may be readily sifted out of the fine sand.

All seeds, whether planted in rows or broadcasted, should be covered with earth one inch and a half deep. If seeds are to be sown broadcast, sprinkle them with flour before sowing, so that an idea of the quantity on a given space may be obtained; when whitened with flour, they are readily perceived on the surface, and can be covered with earth the desired depth. One thousand seeds to one yard of a five-foot bed will be sufficient. For the Province of Ontario, October is the best month for planting seeds and roots (1).

Apple and Vine in China. (Horticulture in China). — *The Indian Agriculturist*, Vol. XXXVI, No. 9, p. 276. Calcutta, Sept. 1, 1911. **3153**

Apples the size of green peas were among the horticultural curiosities observed by one of America's agricultural explorers during a recent trip through Northern China and Manchuria. **China**

The productiveness of the trees is something marvellous. The bright red fruits are eaten fresh or dried, or made into preserves, by both Russians and Chinese.

Most remarkable is the method of growing grapes in China, the vines being buried in winter. They are grown upon arbours overhead in the summer; but after the first cold snap in autumn.

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(1) GINSENG (*Panax quinquefolium*, Linn. *P. Ginseng*, Myer. *Aralia quinquefolia*, Decne & Planch.) Though credited with stimulating, aromatic, alterative, carminative and tonic properties, the root is seldom used in American (and in European) medicine except as a demulcent. The high price that it commands in China, led to extensive research for a substitute, which resulted in the discovery in 1716 of American Ginseng, *Panax quinquefolium*, near Montreal, Canada. This root was favorably received by the Chinese, and soon became an important article of export. During the past 40 years the price of American Ginseng has advanced nearly 700 per cent. With the advancing prices and the diminishing wild supply came experiments in Ginseng cultivation, most of which failed through ignorance of the plant's peculiarities (M. G. KAINS in L. H. BAILEY, *Cyclopaedia of American Horticulture*. London-New York). For further information on Ginseng see: M. G. KAINS, *Ginseng, its Culture etc.* Orange Judd Co. 1889; *U. S. Dpt. Agr. Div. of Botany Bull.*, No. 16, Revised by M. G. KAINS in 1898. (*Ed.*).

they are taken down, pruned, tied together in long bundles, and laid in pits, covered with old matting and a couple of feet of soil. A few openings are left to admit air in moderate weather; but these are closed in case it turns very cold. The roots of the vines, of course, are not disturbed, but are swathed in matting and well covered with earth.

This method is suggested by the Department of Agriculture as a possible means of growing choice varieties of grapes for table use in the Rocky Mountain region.

3154 PORTELE. **Currants in Greece.** (Die Korinthenfrage in Griechenland). — *Allgemeine Wein-Zeitung*, 28. Jahrgang, Nr. 39, (Nr. 1448) pp. 415-417. Wien, 28. Sept. 1911.

The currant is a very important product in Greece for it represents more than 30 % of its exports. For the last 20 years there has been a surplus-production. Greece has given a special attention to this product when negotiating commercial treaties with other countries.

Greece Currants are dried grapes of small size, without pips; they come from blue grapes. This kind of grape is only cultivated on the Peloponnesian coasts and in the Ionian Islands. Attempts have been made to grow currants in other parts of Europe and also in California, but no satisfactory results were obtained. They ripen in July and are put to dry in the sun, covered with sand.

The provinces richest in this product are Elis, Messenia and Achaïa. The best quality is that of Vostiza. The most important markets are at Patras, Pyrgos, Kalamata and Cephalonia. The best qualities are exported in small boxes of 30 to 60 kg. (66 to 132 lbs.); the other qualities are sent in bags and barrels.

Sultanas are produced like the currants but they come from white grapes. In Greece they are cultivated only on the plain of Argolis and in Asiatic Turkey round Smyrna. The sultanas are more carefully packed.

Raisins come from various varieties of grapes and are much like the Malaga grapes.

In 1903 the production of currants on an area of 75 000 ha. was 389 000 000 Venetian pounds (1 Venetian pound = 1.05 lb.).

(1) See Abstr. 1863, *Bull.* June 1911. (*Ed.*).

The mildew reduced the production, during some years, to 18 000 Venetian pounds. The currants reached a high price at the time of the custom conflicts between France and Italy. In order to destroy the effects of the surplus production the Governement has put a tax on the exports while trying to help the local brandy and cognac industry.

ANTONIN ROLET. **The Preservation of Fresh Grapes.** (La conservation des Raisins à grappe fraîche). — *La Nature*, 39me An., N. 2002, p. 150. Paris, 7 octobre 1911. **3155**

To keep grapes for a long time, it is best to use a process which keeps them quite fresh. In fact the loss of moisture by evaporation must be made up, without danger of the fruit rotting. Late grapes do best. **France**

The method most largely used is that popularised by Rose Charmeux. The bunch is cut with a piece of the cane (three or four buds below and one or two above), and this is put into water. At Thomery and Conflans (Seine-et-Marne), large quantities of " chasselas doré " are kept like this every year; they come onto the Paris market from December to April.

For this purpose the grapes are picked about the 15th. of October, preferably in somewhat clondy weather. The best healthy bunches are selected; they should be not too much exposed to the sun, though quite ripe, that is rather of a transparent glaucous tint than golden or spotted with brown. The earlier-picked bunches, being the healthiest, keep longest; the earliest occur on the lowest anes.

The cane is put with its longer end in a small pot two-thirds full of water. If it has been ringed (as is frequently done to increase the size of the bunch), the ring must be under water. The pots are filled a fortnight before the picking of the grapes; the water should be filtered; each pot should have in it a piece of wood-charcoal or a little charcoal dust (it is, however, sometimes said that grapes kept in water with charcoal lose some of their sugar and flavour); a pinch of sea-salt (about 3/4 oz. per gallon) should also be added. The use of a few drops of brandy instead of the charcoal and salts has been proposed.

Two or three canes may be put into one pot, according to the size of the bunches, or one cane may bear two bunches, but these must not touch.

The pots are of varions sizes and shapes ; simple bottles hung on strings will do, but are not very convenient. The flasks gene-

rally preferred have long necks, and hold about one-sixth of a pint, being 6 in. high and 2 in. wide; the mouth has a wide rim so that the flasks can be stood in openings in shelves, racks. etc. The arrangement is such that the bunches cannot touch the flasks or one another. Zinc troughs are also used sometimes.

Dr. Contant recommends ordinary flasks (8 to 10 in.) filled with water; the cork is bored with a round file (known as rat's-tail); it is then cut in two, the cane of the bunch of grapes is put between the two halves, and the whole fixed in the neck of the flask. The flasks are put upside down in holes cut in shelves.

Richard's phials should also be mentioned: in this case, either end of the cane is put into a phial and held by a rubber cork; consequently there is no evaporation either from the top end of the cane or from the surface of the water.

The fruit-room should be kept closed, only being visited from time to time for the removal of bad grapes, aeration, etc.

With ordinary open flasks the air soon becomes very damp, which does not improve the keeping qualities; in this case the air should be changed when the hygrometer shows more than 70 or 75 %, but suitable weather must be chosen. A good plan is to have heaps of quick-lime in lumps here and there (44 lbs. per 100 bottles); it should be renewed when it has fallen to powder. Calcium chloride is even better, as it does not absorb carbon dioxide. Another method is to wax over the free end of the cane to check evaporation; this is especially to be recommended for such soft-wooded varieties as "Frankental", "Black-alicante", and "Gros colman". The water for filling up the flasks must be at the same temperature as that already in them (it should be kept in the fruit-room).

For the room itself, the following conditions should be fulfilled: darkness, air containing a good deal of carbon dioxide, temperature low and constant, moisture enough to prevent shrivelling of the grapes, means for keeping out frost, cleanness of utensils and air.

The chief difficulty in keeping grapes is rotting-grey rot (1), blue rot (2), black rot (3). At Thomery the names *eurdrit* and *œil de perdrix* (partridge's eye) are used for a rot which appears almost

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(1) Grey rot of vine - *Sclerotinia Fuckeliana* (De Bary) Fckl., *Botrytis cinerea* Pers. (PRILLIEUX, *Maladies des Plantes agricoles*. T. II, p. 420. Paris, n. d.).

(2) *Penicillium glaucum*.

(3) *Aspergillus funiegatum* and A. *niger*. (*Ed.*).

instantaneously, like grey rot in the open, and may carry off the whole stock of a fruit-room in a few hours. In damp weather, or if frost gets at them, the grapes become covered with minute points, at first yellowish, then pale yellow, and eventually ringed round by the same colour, thus forming the " partridge's eye " ; the grapes finally burst. Sometimes they turn reddish, and drop at the slightest touch. As soon as any sign of the disease appears, the diseased parts are removed and the rest used as soon as possible, as no remedy is known.

M. Passerini has recommended the following general means for combating rot of grapes : ½ to 1 gm. of formaline is required per cu. meter of space (½ to 1 oz. per 1 000 cu. ft.); it is heated gently on a sand-bath. For a large room it is better to have several heaters ; for a very small room the formalin may be left to evaporate without heat. Fumigation should be carried out every other day of required.

A. Rolet. **Transport of Fresh Grapes to Long Distances.** (Transport à grande distance des raisins frais). — *Journal d'Agriculture pratique*, 75e Année, T. II, N. 40, pp. 436-437. Paris, 5 Octobre 1911. **3156**

In addition to the precooling, refrigerator, or ventilated cars or ships, the Russians (district of Odessa), and especially the Spaniards, make much use of powdered cork (poudre de liège).

Russia. France Great. Britain. Spain.

The so-called Almeria grapes keep well, owing to the thickness of their skins.

They are gathered when three quarters ripe, the damaged grapes are removed from the bunches, and the latter are packed on the spot in barrels, preferably of deal. These barrels, which contain 55 to 77 lbs. gross, are about 20 in. high, with a diameter of 12 in. ; while those holding 27 ½ lbs. net, and 44 lbs. gross, are 12 in. high, and 10 in. in diameter. They all have wooden hoops. The grapes do not keep so well in beech-wood barrels, owing to the staves being perfectly air-tight.

Alternate layers of pulverised cork and of grapes are placed in the barrels, the packing being done fairly tightly.

The cork must be of the best quality, light, soft, and consisting of particles of medium size.

Both it, and the grapes, must be perfectly dry. Sixty pounds of cork are necessary for packing 600-1000 lbs. of grapes.

The Municipal Agricultural Office of Aix, which is under the direction of Mr. Granel, has tried the experiment of exporting table-grapes to England. The method employed resembles that practised in Spain. According to Mr. Granel, the Spanish Almeria and Denia grapes appear to be treated with some sterilizing preparations before they are packed and their preservation is thought to depend much on this precaution. It is alleged that the pulverised cork is boiled, passed through steam, and sterilized by means of carbonic acid gas or sulphurous acid.

Mr. Barody, member of the Society for the study of improved packing methods also recommends cork as a packing material for grapes. The operation is as follows:

The extremity of the branch which bears the bunch is surrounded with a pad of special cotton which is very hygroscopic and which has been steeped in water. These pads are from a half to three quarters of the size of a hen's egg, according to the thickness of the branch. They are enveloped in paraffined water-proof paper and tied firmly with string to the branch.

The grapes are packed in layers alternating with layers of powdered cork or any other isolating material, such as bran, pulverised peat, etc.

Bran is to be recommended as being the most economical, absorptive and cleanly, as well as affording the best protection from the heat. The packing must be tight. Grapes with thin and delicate skins should first be enveloped in a sheet of paper (pink or blue) which sets them off, and, at the same time, prevents their acquiring an odour from the bran or cork during their long journey.

The writer states that the union in cooperative associations of those interested in grape export is necessary, in order to overcome the many difficulties connected with the trade, and to ensure obtaining remunerative and steady prices on the markets.

3157 **Experiments in Preserving Grapes in Cold Chambers for Exportation in Victoria.** (Essais de conservation en chambre froide des raisins en vue de l'exportation en Victoria). — *Bull. de l'Office du Gouvernement Général de l'Algérie*, N. 19, p. 295. Paris, 1 Octobre 1911.

Australia: Victoria

Grapes from several varieties of vines, grown at the College of Viticulture at Rutherglen, which promised well for export purposes, were submitted to a course of cold storage experiments, having been first packed in pulverised cork.

After remaining about three months in the cold chamber, the products arranged according to points from 1 — 10 gave the following results.

Ohanez	10	Servan	7
Olivette blanche	9 ½	Olivette rose	4
Tendron du Cadanet	9	Valensy	4
Malvoisie des Chartreux	8 ½	Doradillo	8-9
Malaga rose	8	Raisin noir de Tatura	8 ½

E. A. BUNYARD. **An Index to Illustrations of Apples.** — *Journal of the Royal Horticultural Society*, vol. XXXVII, part. I, pp. 152-174. London, October, 1911. **3158**

This index has been compiled to assist those engaged in pomological research. The question of synonyms has not been touched, except in cases were it is quite obvious.

Class-grouping has been adopted. A list of works indexed and remarks on the plates are also given. 559 varieties (some of which include many subvarieties) are indexed. **Great Britain**

Citrus Industry in South Africa. — *California Fruit Grower*, No. 1233, p. 13. October 7, 1911. **3159**

Rhodesia is preparing to invade the world's citrus market on a large scale. It is claimed that both the soil and climate there are well adapted to citrus culture. Wild lemon and lime trees grow abundantly on the *veldt*, and these are being used to bud to, since it is said that they have developed root systems which will not require irrigation. The cheapness both of the land and of unskilled labor in South Africa is said to more than offset the extra expense of the cost of transportation from that distant country, and the fact that Rhodesian fruit ripens during the summer is held to be another advantage, as it can be put upon the market at a time when oranges are scarce. While it is not probable that the South African growers will attempt to enter the New York market at present, experimental shipments have been sent to London and if the competition in the London market becomes too strong, the result will undoubtedly be that more of the West Indian and Mediterranean fruit will be sent to New York. **South Africa**

3160 **The Papaw-tree** (1). (Les Papayers). — *Bulletin agricole du Congo Belge*, vol. II, pp. 488-492. Bruxelles, Septembre, 1911.

Discussion on the origin of *Carica Papaya L.* Botanical description and habitat of *C. Papaya L.*, *C. Condinamarcensis*, Hook. (« Mountain papaw-tree »), *C. quercifolia* Solms or *Vasconcella quercifolia* D.C. According to Baillon the fruits of the following species can be utilised: *Carica cauliflora* Pon, *C. dodecaphylla* H. B., *C. mamaya*, *C. microcarpa* Poir, *C. pyriformis* H. B.; and according to De Wildeman the fruits of these two species are utilised: *C. peltata* (« Monkey's Papaw ») (sometimes cultivated in Central America) and *C. dolichaula*, Donn. Sm.

Belgian Congo. Central America

The author states that although the Papaw-tree (*Carica papaya* L.) is considered dicœcious this character is not absolute.

3161 David Fairchild. ***Punica granatum.*** (Seeds and Plants imported during the period from January 1 to March 31, 1910: Inventory No. 22, Nos. 26471 to 27480). — *U. S. Department of Agriculture. Bureau of Plant Industry.* Bulletin No. 207, p. 36. Washington, 1911.

Punica granatum L. From Hwai-Yuan, China. Presented by Dr. Samuel Cochran, American Presbyterian Mission. Received February 9, 1910.

China. United States

Cuttings of the following; notes by Dr. Samuel Cochran:

26 794 « Manao shihliu » Carnelian pomegranate. The fruit is long instead of round, and the end attached to the twig is pointed. Kernels are large and the flavor good.

26 795 « Yushih tzu-tzu shihliu » Jade seed pomegranate. White kernels, like rock candy. The flavor is good and does not cloy. The most valued variety we have.

26 796. « Peh-hwa-shihliu » white-flowered pomegranate. So called from the color of the blossom. The leaves are not red when first opened as are other varieties; the fruit is not ruddy like others and the kernels are white; the fruit is large, but rots easily and drops from the tree, so the yield is small. It is of good flavor.

(1) See Abstr. 1437, *Bull.* May 1911. (*Ed.*).

The Exportation of Fruit from Canada. — *The Gardeners' Chronicle*, No. 1293, Vol. L, p. 259. London, October 7, 1911. 3162

The success of the exportation of apples from Canada has encouraged Canadian growers to seek European markets for other of their fruits. With the aid of the Government of the Dominion, experimental consignments of Peaches, Pears, Grapes, and Tomatos have been sent to Britain, and have arrived in London, Glasgow, and elsewhere in excellent condition. Thanks to care in packing, to cold storage, and to continuous records of temperature during the journey, the difficulties of long-distance transport appear to have been so thoroughly overcome that Canadian Anjou Pears are to be bought in Birmingham.

Canada. Great Britain

Forestry.

DECOPPET, WAGNER, ALBISETTI. **Forest-Economy in Switzerland** (1). (VIII^me^ Exposition suisse d'Agriculture, Viticulture, Sylviculture et Horticulture à Lausanne-10-19 Septembre 1910. Rapport du Jury de la Section des Forêts). — *Journal Forestier Suisse*, 62^me^ A., N. 8-9, pp. 145-168. Berne, Août-Septembre 1911. 3163

From the Report of the Judges of the Forestry Section of the last Swiss Exhibition of Agriculture, Vine-growing, Forestry, and Horticulture, the following information is drawn :

Switzerland

Area of Forests in Switzerland.

Owners	hectares	acres	percent.
The State (i. e. Cantons)	41 591	102 773	5
Communes and Corporations . . .	653 689	1 615 290	69
Private individuals	255 412	631 133	26
Total (including some pastures with trees)	950 692	2 349 200	100

(1) See this *Bull.* Dec. 1910, p. 286. [*Ed.*].

This area is 23 % of the productive area of Switzerland.

Management by Forest Experts.

		hectares	acres
Total area of Public Forests		695 280	2 246 423
Forested areas under Expert Management	State	41 591	102 773
	Communes	51 074	126 206
	Total	92 665	228 979

Under Expert Management, 13.3 %.

At present professional forest agents are employed by 43 communes.

Protective Forests cover 676 030 *ha* (1 676 500 *ac.*), *or* 71 % *of the total area.*

Yield of the Forests.

a) 1908 cut of timber in the Swiss forests:

	cu. m.	cu. m. per ha.	cu. ft.	cu. ft. per ac.
State Forests	175 000	4.08	6 178 000	60.0
Forests of Communes employing experts	220 000	4.27	7 776 000	63.1
Forests of the remaining Communes . .	1 484 000	2.46	51 370 000	36.2
Forests privately owned (approximate).	421 000	1.55	14 860 000	22.8
Totals	2 300 000	2.42	81 000 000	35.9

b) Returns from communal forests under expert management (in francs: 25.25 fr. = £1; 100 fr. per ha = £1.16s per acre; 10 fr. per cu. m. = 2.70*d* per cu. ft.):

Gross returns			Expenses			Net returns		
total	per ha.	per cu. m.	total	per ha.	per cu. m.	total	per ha.	per c.m
Plains and hills:								
2 020 000	135.30	20.21	872 000	58.40	43.1	1 148 000	76.90	11.48
Lower slops of mts., and Jura:								
1 818 000	143.35	23.27	716 000	56.44	39.3	1 002 000	86.41	14.19
High mountains:								
624 000	26.60	14.94	371 000	15.80	59.4	253 000	10.80	6.07
Totals and averages:								
4 462 000	87.36	20.33	1 959 000	38.34	43.9	2 503 000	49.02	11.40

Nature of Public Forests.

	High forest	Copse, and copse-with-standards
Forests owned by the State . .	94.9 %	5.1 %
Forests of Communes and Corporations	88.6 %	11.4 %
Average	89 — %	11 — %

Consumption of Wood.

The total consumption of wood in Switzerland is 3 million cu. m. (106 million cu. ft.), of which 76 % comes from the Swiss Forests, and 24 % is imported.

The utilisation is as follows:

	Fire wood	Building wood
Products of Swiss Forests. .	1 300 000 cu. m. = 56 % 45 900 000 cu. ft.	1 000 000 cu. m. = 44 % 35 300 000 cu. ft.
Importations	300 000 cu. m. = 43 % 10 600 000 cu. ft.	400 000 cu. m. = 57 % 14 100 000 cu. ft.
Total. . .	1 600 000 cu. m. = 53 % 56 500 000 cu. ft.	1 400 000 cu. m. = 47 % 49 400 000 cu. ft.

The improvements in forest economy lately carried out are:

Management: closer connection between management and administration, which should work together for the same end; increasing liberty for the agent, except as to the output; better organization of the registration of inventories, and of the control of felling.

Sylviculture: rapidly increasing return to natural regeneration, and to composite forests; that is, to forests containing, on a given area, grades of trees of different height and size; intensive thinning; more intimate mixing of species.

Exploitation and technical work: development of haulage facilities; better utilization of the timber by better grading and increase of the percentage of building wood.

Forest policy and administration: suppression of allotment by stems; joining together of private forests; better organization of the canton forest service, tending towards the same arrangements as the district administration; improvement of the conditions for agents and officers; reorganization of the system of sales in the public forests.

3164

Progress Report of Forest Administration in Burma for the Year 1909-10. — *The Indian Forester,* Vol. XXXVII, N. 9, p. 500-504. Allahabad, September 1911.

British India: Burma

Of the total area of Burma 65 per cent was reported to be under forest at the end of July 1910. Of this 25,691 square miles are reserved, and 113,007 square miles are included under unclassed forest, which comprises large stretches of scrub of little value, as well as considerable areas of good timber forest often adjoinin reserves. 2,063 square miles were taken from unclassed forests and added to the reserved area during the year, mainly with the object of protecting the head-waters of streams. In Upper Burma there are some 12,000 square miles more forest than in Lower Burma, though there is little difference at present in the area of reserved forests, and there will probably be no difficulty in future in largely increasing the area of reserved forests in Upper Burma as it is found necessary.

All the best teak-bearing forests have now been reserved, and most of these are under working-plants, but from the girdling statement it is evident that large areas of teak forest still exist in the unclassed forests, no less than 35,000 out of a total of 113,000 trees girdled having been obtained from these forests, in which the teak is usually scattered. Girdling in these forests is usually done under a girdling scheme made for a certain number of years and based on area.

A very interesting note is included by the Conservator of Forests, Tenasserim Circle, on the Mergui rubber plantation, which was sold by Government to a company during the latter part of 1910. The area under *Hevea* rubber when the garden was sold was 1,539 acres, and during the year one and a half million seeds were collected; 28,000 of these were attacked by the *Nectria* fungus.

Measurements were taken by means of experimental plots to test the growth when the plants are kept well weeded as compared with the growth on unweeded land, and the former was found to be greater in the proportion of 4 to 2.7, and the plants on the weeded area have a much healthier appearance. The Burmese thatching grass, *Imperata cylindrica*, has given much trouble, and is difficult and expensive to eradicate, but cuttings of passion flower may eventually be able to subdue it. The growth of the passion flower is not at first strong enough to compete with the grass, unless the latter is constantly cut back.

From about 5,000 trees 12,100 pounds of wet rubber were obtained, yielding 7,800 pounds of dry rubber. The loss in this

case by drying was 36 per cent, but was exceeded in the case of another tapping, when 4,750 trees planted in 1902 were tapped lightly, the outturn of 2,268 pounds of wet rubber yielding only 1,188 pounds of dry rubber. The cost of tapping and preparing the rubber came to 6 annas 11 pies (6.92 *d*) per lb. of dry rubber in the old plantation, and the average cost of delivering the rubber in London was 15 annas (1 *s* 3 *d*) per lb.; including collecting and all charges, 6,778 pounds of rubber were sold for Rs. 5. 13. 8 (7*s* 9.6*d*). per lb.

Small numbers of the following exotic rubber bearing trees were growing in the plantation : *Dichopsis Gutta, Willoughbeia firma, Castilloa elastica, Funtumia elastica*, and *Mimusops Balata*, and appear to be doing fairly well.

W. J. MORRILL. **On the Management of the United States National Forests.** (Silvicultural Systems on the National Forests. Reports on Supervisors' Meeting at Denver, Colorado. Silviculture). — *Forestry Quarterly*, Vol. IX, No. 3, pp. 431-433 (429-449). Toronto, September, 1911. B. K. KIRKLAND. The Need of a vigorous Policy of encouraging Cutting on the National Forests of the Pacific Coast. — *Ibid.*, pp. 375-390. **3165**

Much has been written on the management of the U. S. National Forests. It may therefore, be, worth while to know two recent competent opinions ; the one assuming to speak for the National Forests as a whole, the other for a particular region of special interest as regards the world's wood production. **United States**

Supervisor W. J. Morrill, of the Rio Grande, in a paper read before the Supervisors' Meeting of District 2 at Denver, Col., on the Jannary 24, 1911, states that the U. S. National Forests will serve for protective forests, and only secondarily as a source of supply for lumber ; hence, he believes that the *selection system* promises always to be the system most commonly used on the National Forests.

Mr. Morrill considers the selection system under shelterwoods as compared with the shelterwood group system.

The disadvantages of the selection system under shelterwoods are reported as follows: 1, the cost of logging is high, because a large area must be covered for the crop ; 2, it is claimed that growth is 10 per cent. slower than in other systems of silviculture. The advantages are stated: 1, less skill is required to carry out the system, and therefore, less liability to make silvicultural mistakes ; 2, the

timber is usually of large size, and, therefore, is marketable in places where small timber is not.

The main disadvantages of the shelterwood group system would be: 1, it opens up the soil to drying influences more or less according to the size of the clearing, whereas the selection system by single trees disturbs the forest conditions the least of any system; hence for protection, the group method is not as desirable as the single tree method; 2, since the group method aims at disposing of the old stand within a comparatively limited time, many years must elapse after the young crop is formed before a supply of saw timber is again available; this would be a disadvantage if the *stand* is expected to supply a steady demand always present, or is not of an area large enough to be divided into compartments which are treated successively, and enough compartments to round out the cycle of rotation. The advantages of the shelter wood group system being: 1, this method can be used to best advantage only where a market exists for small lumber and cordwood; 2, it is claimed that it protects young growth satisfactorily from frost and snow and against drought; 3, no data are available to show how it compares with other systems in the relative production of wood.

Under the present economic conditions, in the United States, Mr. Morrill believes that the selection system by single trees is generally preferable to the group system. Since it is not profitable to cut over a selection forest annually, a period of years must elapse between cuttings. This should be obtained by the Van Mantel formula expressed as follows: $b = \frac{S}{1/2\,a}$ in which b represents the amount of timber which should be cut annually, S represents the actual amount of timber per square unit in the stand, a represents the most profitable age at which the timber is ready for cutting.

The seed tree system is then considered as a poor system on account of the windfall. Clear cutting by the compartment plan is not feasible on the western U. S. National forests on account of cost of artificial regeneration. The true compartments system under shelterwood may be preferable. Several preliminary thinnings and one seeding thinning should take place. The advantages are summarized as follows: 1, the production of wood and quality are unsurpassed: 2, the shelter trees may be grown into larger timber than the bulk of the crop and the annual increment laid on the shelter trees is large: 3, the soil, humus and moisture are not as much affected as in clear cuttings. Disadvantages: 1, danger to the seedlings from frost, insects, weeds and grass is larger than in the selection system; 2, the shelter trees may be windthrown; 3, greater

care is required to manage this plan successfully; 4, moisture and soil conditions are more disturbed than in the selection system.

In conclusion the value of the selection system is emphasized by Mr. Morrill, and it is urged that the United States shelter forests be regulated to a sustained yield basis.

A somewhat different opinion, at least as regards the U. S. National Forests of the Pacific Coast, is viewed by the Forest Supervisor Burt. P. Kirkland in the contribution above quoted. He believes that the methods of cutting policy advocated for the United States National Forests as a whole are not adapted to the National Forests in Washington and Oregon. These forests are, however, destined to furnish a far greater portion of the cut from the National forests than their area indicates. Eaeh of the several National forests in this region will furnish a greater sustained annual yield than the entire National forest area in some of the six districts among which the National forests are distributed.

From the discussion of the special conditions and of the needs of this particular region, it may be concluded that:

1) Though timber on the Pacific Slope is seldom needed for actual consumption locally, it is nevertheless urgently needed in the development of local industry, and for shipment to other parts of the United States.

2) Since the forests are covered for the most part with over-mature stands, loss by decay is rapid, and at least offsets all growth. The attempt to store up all of these stands cannot therefore result in any benefit to the future. Incidentally, it is noted, that no cuttings shonld be permitted in thrifty stands less than 150 to 200 years old. If the sustained annual yield management is to be the method used in managing National Forests, the immediate future can in no wise be benefited by keeping the present output of the forests below a sustained annual yield basis.

3) From this it follows, that withholding cutting from the National Forests now merely results in the loss of the present revenue witout adding anything to future revenue. All possible present reveune within a sustained annual yield basis, which is not taken, will be irrevocably lost. This loss will amount to from $ 3 000 000 to $ 4 000 000 annually from Washington and Oregon.

4) Present cutting can, without any damage to the future, yield liberal revenues to Federal and State Governments with consequent favorable effect on public opinion; and on appropriations vailable for forestry work.

5) National Forests should be made the best possible examples of forest management; allowing over-mature timber to go to waste is inconsistent with such policy.

6) Cutting should take place on the best forest soils first, where they bear over-mature and decadent stands.

7) Storing timber on National Forests will tend to encourage more cutting on private lands with the result of further decreasing State revennes through taxation.

3166 W. L. JEPSON **The Silva of California.** (*Memoirs of the University of California*). — London, T. Fisher Unwin; Berkeley; University Press, 1910. Reviewed by W. J. Bean (Californian Trees) in *Nature*, Vol. 87, No. 2188, p. 452-453. London, Oct. 5, 1911.

United States: California

Among the later investigators of the Californian silva a foremost place is held by the author of this volume. Only two years ago he published an admirable little book, « The Trees of California », of which the present elaborate work is an amplification. The new volume opens with an interesting essay on the remarkable topography of California, its climate, rainfall, and tree distribution. The two great mountain systems (the Coast Ranges and the Sierra Nevada) enclose a great oval plain known as the « Great Valley », drained by the San Joaquin and Sacramento rivers, which meet about midway, and empty into the Pacific. This region, 400 miles long and averaging about 50 miles in width, is sparsely wooded and weak in number of species. One peculiar characterlstic of its scenery is the park-like grouping and disposition of a few species of oak, chiefly the Valley oak (*Quercus locata*) and the Live oak (*Q. Vislizenii*). They never form forests as the coniferous trees of the foot hills and mountain slopes do, and scarcely anywhere in this central plain does an aggregation of individuals amount to more than what may be termed a grove.

Besides the great valley of the Sacramento and San Joaquin, the author discusses his subject from the point of view of four other great geographical areas: 1) the Sierra Nevada, the chief sylvan interest of which belongs to the long western slope, where occur the Big Tree groves, the eastern slope being remarkably abrupt; 2) the North Coast Ranges, a region rich in individuals and species, including the Redwood and many others which extend northwards into Oregon and Washington; 3) the South Coast Ranges, which form an interesting area richest forestally on the seaward slopes, where, among others, flourish the Redwood, Douglas Fir, and *Pinus ponderosa*. This region includes the remarkable peninsula of Monterey, where the well-known Monterey cypress of our gardens (*Cupressus macrocarpa*) is endemic; Southern California,

where the rainfall is deficient and the arboreal growth confined to mountain valleys and cañons, and where, in many places, vegetation is of a purely desert character.

Spread over these five forest provinces are the ninety-four species of trees which come under the author's purview. The whole essay, which is one of remarkable interest, is the result, as Mr. Jepson tells us, of nineteen years' travel and study in the field.

The Forest Reserves in the French Congo. — *La Quinzaine Coloniale*, No. 19, pp. 665-666. 19 Octobre 1911. 3167

In order to protect the forest reserves of the Congo against an intensive felling for the sale of timber, a decree dated April 14th, 1904 forbade the exportation of mahogany (1) and Okoumé (2) logs of less than an average diameter of 75 centimeters (30 inches) for unhewn tree trunks, and 0^m 50 centimeters (20 inches) for squared trees. Experience has shown that this regulation was too stringent to allow of the economical utilisation of the forest property of the colony. Therefore a decree dated Sept. 28th, 1911 modifies this regulation and states the new dimensions below which the exportation of timber is forbidden. French Congo

(1) Mahogany is *Swietenia Mahogani* Linn. Meliaceae, which abounds in tropical America. There is however much timber designated by the name of mahogany which is not produced by the above species. African, Senegal, Madeira or Cailcedra mahogany is obtained from trees similar to the above mentioned, the specific nature of which has not yet been well determined; according to some authorities it is obtained from "*Khaya Senegalensis*" and according to others from *Carapa Procerà* D. C. (*Carapa Touloucouma*, Guill. and Perr; Flor. Sénég. I. 28) and perhaps also from both varieties.

Regarding the controversy on the origin of this timber, see GUILLEMIN et PERROTET *Fl. Senegamb.* T. 32; *Kew Bull.*, 1890. pp. 168-179; *Kew Bull.* 1894; pp. 8-9 and *Kew Bull.* 1895, pp. 79-80. According to GUILLEMIN et PERROTET, the finest specimens of the *Senegalensis* are found in the Gambia and in the peninsula of Cape Verde. *Carapa procera* exists in Guiana and the West of Tropical Africa. The commercial African mahogany is produced by other trees (J. BEAUVERIE, *Le Bois*, T. II, pp. 936-937. Paris, n.d.).

(2) The "Occoumé" or "Okoumé" (*Bursera*) holds an important place in the Congo forests. The Congo Occoumé was quoted on the market of Bordeaux in September 1903 at 7 to 12 fr. a kilo (2 *s.* 6 8 *d.* to 4 *s.* 4.8 *d.* per lb.). (Ibid. p. 1220).

3168 **Recommandations for the Suppression of Forest Fires.** (Report on Supervisors' Meeting at Denver, Colorado, Operations). — *Forestry Quarterly*, Vol. IX, N. 3, pp. 447-448 (429-449), Toronto, September, 1911,

A Committee appointed by the U. S. (District, 2) Supervisors' Meeting at Denver, Col., on January 26, 1911, made the following recommendations for the suppression of Forest fires :

1) Increased field force.

United States 2) Increased funds for : properly equipped lookout stations ; the purchase and distribution of fire tools.

3) An adequate system of roads and trails located with respect to their use as fire lines.

4) Fire lines to be kept clear by using as stock driveways and located with respect to their use as roads and trails.

5) Intensive and systematic patrol, with adequate telephone systems.

6) Reduction of inflammable material by the removal of dead and down timber and the disposal of brush on timber sales by piling and burning.

7) Smaller administrative units for rangers and supervisors.

8) Definite and intimate co-operation between supervisors of neighbouring forests, and ranges of neighbouring districts.

The following measures were recommended for immediate adoption : increased field force ; increased funds ; the complete equipment of the more commanding lookout stations ; the systematic extension of roads, trails and telephone lines; intensive and systematic patrol ; the heavy grazing of areas where it would reduce fire danger ; smaller administrative units ; the proper equipment of all railroads operating through forests ; definite and detailed co-operation between neighbouring forest officers.

3169 R. Rogers & B. Moore. **A Method of Assessing Fire Damages in the Southwest.** — *Forestry Quarterly*, Vol. IX, N. 3, pp. 412-419. Toronto, September, 1911.

A detailed statement of a suggested method for finding the United States value of forest products destroyed by fire in the Southwest of the United States.

The Authors classify the products destroyed by fire under the following four headings:

1) Merchantable timber (all trees exceeding 6 inches in diameter, chest-high).

2) Pole stand (all trees between 6 inches and 12 in. chest-high).

3) Reproduction (both seedlings and saplings, *i. e.* everything up to 6 inches chest-high).

4) Forage (the actual amount of grass).

As regards the method of estimating, the Authors believe, that the following points should be strictly adhered to:

1) All four classes of damage can be estimated at once, but a separate tally must be kept for each.

2) Estimating should be done by strips rather than by sample acres, either circular or square. Single acres may be taken if in strip form, not more than two chains wide; one chain wide is preferable.

3) The strips should be run through the burn in such a way that their result will give as near the average conditions of the burn as possible.

4) Obtain the area of the burn as accurately as possible. A suggestion would be to find the average leugth and average width by means of strips run at right angles through the length and breadth of the burn.

5) The estimate of damage to the merchantable timber, poles, and reproduction, should not be made until at least four months after the fire, since then the trees which will live or die can be distinguished with a greater degree of accuracy. The area for estimating the amount of damage to the forage should be determined at the time the fire is extinguished.

Some other practical hints may be reported. Thus, a more correct present value of the merchantable timber is stated to be found:

a) determining as near as possible the length of time within which the timber upon the burned area could have been sold. A minimum figure within the nearest five years should be used;

b) finding the rise in stumpage value, for the period above decided upon, and add this to the present stumpage value. Then multiply the volume destroyed by the increased stumpage price to find the value of the timber at the time it would have been sold;

c) discounting the value thus obtained for the period decided upon to the present, by multiplying by the proper factor from a discount table. This will give the true future value, discounted to the present at compound interest (at 5 %, a conservative rate of interest). Since this result takes into consideration a minimum rate of stumpage, and a reasonable time withrin which it could be sold, it represents more nearly the actual present value of the timber.

As to the value of forage destroyed:

a) determine as nearly as practicable the total area of range burned over and the number of months during which time forage on this area is lost;

b) determine from standards, which are based upon adopted standards of the locality, the average carrying capacity before the range burned over;

c) divide the total area of range burned over by the carrying capacity factor, for the period for which the forage is lost; this gives the total number of head which the range area previous to the burn would have carried;

d) multiply the total number of head, which could have grazed on the area during the period for which the forage was lost, by the rate per head. This gives the total value of the forage destroyed.

3170 **The Influence of Forests on Drought** (1). — *The Indian Forester*, Vol. XXXVII, No. 9, pp. 487-489. Allahabad, September, 1911.

British India: Burma

From Burma, Mr. Watson, Deputy Conservator of Forests in charge of the Southern Shan States, writes: " I have no doubt whatever that disforestation is responsible for the scarcity of water in many places, notably in the Myelat plateau, and this fact is so patent that the natives in many localities admit it ". He shows that this plateau, covering some 200 square miles, was originally covered with fine forest which has gradually been exterminated by shifting cultivation, so effectually that to-day over perhaps half the area scarce a tree is to be seen, and that as a consequence the water-supply has become scarce. During the rains the streams are subject to very sudden and violent floods which subside as quickly as they rise, leaving the beds of the streams almost dry. Mr. Watson further shows that some Palaungs, a Shan tribe, who live principally by shifting cultivation, were located in the catchment area of the Paung stream, a large feeder of the Zawgyi river. As a result of the clearings made by them in five years, the water in the stream dried up and they were obliged to migrate elsewhere.

The Kywedat village, situated on a feeder of the Zawgyi river in the Lawksawk State, was formerly surrounded by extensive rice fields; these have now been unworked for years owing to the failure of the water-supply following the deforestation of the surrounding hills.

(1) Cf. Abstr. 867, *Bull.* March 1911; Abstr. 2167, *Bull.* July 1911. [*Ed.*].

There is evidence showing that 20 years ago, a perennial stream flowed past the village of Thebya in the Lawksawk State. The catchment area of this stream has been denuded of its forest growth, and the stream now runs dry every hot weather.

In Bengal, it has been possible to compare two rivers, the one flowing through reserved forests, the other with its catchment area stripped of its protective verdure. These are the Koina and Rora rivers in Singhbhum, both 30 to 45 miles in length. The former drains a tract of country of which 80 per cent. is reserved forest, and holds a plentiful supply of water throughout the year. The latter flows through country almost entirely denuded of forest. Its water runs very low even in the cold weather, while in the hot weather it dwindles away to nothing.

A. Schiffel. **Influence of Defective Measures on the Contents of Unhewn Timber.** (Uber den Einfluss fehlerhafter Bestimmungen der Dimensionen auf den Inhalt von Rundholz). — *Centralblatt für das gesamte Forstwesen*, 37. J., 819. H., P. 371-390. Wien, Aug. Sept. 1911. **3171**

The valuation basis of timber for sale being the unit of volume, whatever error occurs in its measurement acts disadvantageously on the sale-price. Consequently it is very important to know the causes which modify the valuation of the cubic contents of timber. **Austria**

The author, after a thorough investigation on these causes of error and their influence on cubic measurement, establishes the following practical rules :

1. The callipers used for measuring timber should be adjustable, in such a way as to avoid a false position of the sliding cross arm. Besides this the construction of the callipers should be such as to prevent the cross arms from yielding even under strong pressure.

2. In order to lessen the influence of the defects in the callipers, their horizontal bar should be placed as close as possible to the trunk. The two diameters must be taken as nearly as possible at right angles to each other and their average calculated without neglecting the fractions.

3. The percentual error of the diameter turns out double in the volume.

4. The two-term cubic formulae give a more exact average volume and have besides the advantage of the possibility of compensating errors in the measurements of diameters.

5. To the percentage error in length corresponds a percentage error in volume. The percentage error in length exercises on the

volume only one half of the influence exercised by a similar error in the percentage of diameter.

6. The average length should not be taken by starting from the calculated diameter, but it should include the whole average length.

The author shows by means of the following example, how the sum of several little errors may acquire a very great importance:

Due to the faulty position of the calliper arms	2 %
Due to the yielding of the arms	1 %
Error in reduction of diameter	2 %
Total error	5 %

Finally this total error, of 5 % in the diameter, becomes an error of 10 % relatively to the volume.

3172 A. ENGLER. **Opening of Buds and the Shape of Beech and other Broad-leaved Trees grown in Shade and Sunlight.** (Untersuchungen über den Blattausbruch und das sonstige Verhalten von Schatten und Lichtpflanzen der Buche und einiger anderer Laubhölzer). — *Mitteilungen der Schweizerischen Centralanstalt für das forstliche Versuchswesen*, X. B., 2. H., pp. 188 pl. 6. Zurich, 1911.

Experiments carried out in woods, gardens, and pots with *Fagus silvatica*, *Acer Pseudoplatamus*, *Quercus sessiliflora* and *Fraxinus excelsior*. Phenological and meteorological observations. Duration of experiments and observations: from 1899 to 1910.

Results :

Switzerland Young beech, ash, and oak trees grown in the shade open their buds in spring earlier than unshaded young plants and full-grown trees. The lower leaves of broad-leaved trees open before the upper ones. In beech and other trees with dense leafage the buds and shoots develop earlier in the lower and inner shadier parts of the canopy.

The buds break sooner in diffused light and in damp places. Hence in Switzerland, beeches on the northern slopes show their leaves eight days earlier than those on the southern slopes.

Plants grown in shade and then taken into the open, and vice versa, only gradually adapt themselves to the new condition of light. Shade-grown beeches brought out to the open are earlier than those grown in the light, and for several years retain the shape

acquired; the latter, on the other hand, when brought under shelter, delay their growth.

Plants grown in shade shoot earlier than those grown in full light, but on plants two or three years old the effects of light-intensity are only slight. However, plants grown in the open ground thrive rather better. The buds of beech twigs in well-lit positions are more developed; they form longer spring shoots and have more numerous and thicker scales.

Sudden changes of temperature provoke a rapid opening of the buds, especially in the beech and sycamore. On the other hand the sun and warm nights greatly favour the growth of the leaves and shoots. An intense exposure to the sun is necessary for the growth of the buds and leaves.

The more rapid action of exterior agents on buds grown in the shade depends on their morphological and physiological properties.

From the point of view of practical forestry may be a drawn the following conclusions:

1. Confirmation is obtained of the idea that in the natural regeneration of shade-trees, and particularly of beeches, too extensive or too frequent secondary felling as well as clearing, has harmful results and hinders the growth of young plants.

2. A new factor to be taken into consideration in the regeneration of beech woods is the tendency to particular forms of growth. Thus beech-trees with a hereditary tendency to flat or defective form, are favoured by a prolonged sojourn under shelter and dominate over the upright ones.

3. As to artificial regeneration, seedlings obtained from the forest should not be used. Young trees grown in shade should never be planted out in the open and trees grown in full light must never be used for under-planting;

4. For growing beech seedlings the following rules may be established:

a) Beech seedlings from one to three years old grown in open beds may be planted without danger in light or shade.

b) Young trees planted out in the nursery for several years must be grown in the shade or in the light according to their destination.

c) A little side shade is useful in seed-plots of one or two year old beeches, as it favours their growth. Consequently it is useful to make seed-plots in large glades and on the north borders of woods.

d) The most vigorous and hardy transplanted trees are those grown under direct sunlight.

5. Moreover it is confirmed that the best beeches are those which come from dense plantations. The more unfavourable a soil, and the more beeches tend to take defective shapes, the thicker the plantation should be. In Denmark even as many as 200 000 plants are planted to the hectare (80 000 per acre) with splendid results.

6. When, owing to the condition of the soil or other causes, it is not necessary to employ transplanted trees, it is best to plant the beeches as young as possible and correspondingly thick. Young seedlings of one to three years planted at a distance of 30 to 80 cm. (12 to 32 in.) generally give the best results, for this approximates as nearly as possible to the natural regeneration conditions of the beech.

3173 F. DI TRENTO. **Poplar Cultivation on the Alluvial Soils of the Plain of Friuli.** (La cultura del pioppo nei relitti fluviali della pianura friulana). — *L'Agricoltura Italiana*, An. XXXVII, Fasc. 706, pp. 577-584. Pisa, 1911.

The writer of this article recommends the reforesting of the alluvial sands and gravels which occupy such large areas in the plain of Friuli; he advises the use of White Poplar (*Populus alba*), Canadian Poplar (*P. monilifera*), and Lombardy Poplar (*P. pyramidalis*); recourse may also be had to any other species with thin barks and few knots, not liable to rot, and of rapid growth, so that they may be cut at 10 to 12 years and their wood used when still soft.

Italy: Friuli

The following figures are given per hectare of Canadian Poplar, on the basis of a 12 hectare piece, allowing one hectare to be cut each year. (1)

Number of trees per hectare, 1000 (per acre, 404). From planting to cutting, 12 years. Weight of poles, average 6 quintals (4 cwt. 94 lbs.); value, 95 centimes (9*d.*) cut, but not carted.

No intermediate crop can be grown, owing to the nature and position of the land.

Cost of planting. — Trenching, 50 cm. (20 in.) deep, 5,000 sq. m. at 10 centimes, 500 fr. (£8), harrow and cultivator, to level surface, 80 fr. (25*s.*); 1 000 seedlings at 50c. (400 at nearly 5*d.*), 500 fr. (£8); planting, 5c. per tree, 50 fr. (16*s.*).

(1) The British equivalents in brackets are calculated per acre. (*Ed.*)

Cost during first year. — Two horse-hoes (1), finished off by hand-hoeing, 60 fr. (19*s.* 3*d.*). Interest, 5 % on 300 fr., 15 fr. (4*s.* 9 ½*d.*). Interest on capital of 1130 fr. (£18.2*s.*) at 5 %, 56.5 fr. (18*s.*); various expenses and surveillance, 30 fr. (9*s.* 7*d.*).

Total 161.5 fr. (£2.11*s.* 9*d.*).

Cost up to end of first year, 1291.5 fr. (£20.14*s.*).

Cost during second year. — Replacing dead trees, 30 %, 150 fr. (£2.8*s.*). Two horse-hoes, 85 fr. (27*s.*); interest on sunk capital, 15 fr. (4*s.* 9*d.*), interest on 1291.5 fr. (£20.14*s.*) at 50 %, 64.6 fr. (20*s.* 8*d.*); various expenses, 30 fr. (9*s.* 7*d.*).

Total 344.6 fr. (£5.10*s.*).

Cost to end of second year 1636 fr. (£26.4*s.*).

Cost during third to fifth years. — One horse-hoe per annum, interest on sunk and invested capital, various expenses: 494.3 fr. (£7.18*s.*).

Cost to end of fifth year 2130.4 fr. (£34.3*s.*).

Cost during sixth year. — Hoeing discontinued; interest and expenses, 151.5 fr. (£2.8*s.* 6*d.*), less grazing let out, 20 fr. (6*s.* 6*d.*): — 131.5 fr. (£2.2*s.*).

Cost to end of sixth year, 2261.9 fr. (£36.5*s.*).

Cost during seventh year. — Interest and various expenses, 158 fr. (£2.10*s.* 6*d.*); less grazing, 30 fr. (9*s.* 6*d.*), also net value of faggots cut out in trimming, expenses of this being taken at half the value, 10 quintals (7 ½ cwt.) at 1 fr. = 10 fr. (3*s.* 2*d.*), total 40 fr. (12*s.* 9*d.*): 118 fr. (£. 1.17*s.* 9*d.*).

Cost to end of seventh year, 2380 fr. (£38.2*s.* 9*d.*).

Cost during eighth year. — Interest and various expenses, 164 fr. (£2.12*s.* 6*d.*), less grazing and value of faggots, 30 quintals = 30 fr. (23 ½ cwt. = 9*s.* 6*d.*), total 60 fr. (19*s.* 3*d.*): 104 fr. (£1.13*s.* 3*d.*).

Cost to end of eighth year, 2494 fr. (£34.16*s.*).

Cost during ninth year. — Interest and various expenses, 169 fr. (£2.14*s.*); less grazing and faggots, 50 qls. = 50 fr. (39 ½ cwt. = 16*s.*), total 80 fr. (25*s.* 6*d.*): 89 fr. (£1.8*s.* 6*d.*).

Cost to end of ninth year, 2573 fr. (£41.4*s.* 6*d.*).

Cost during tenth and eleventh years. — Interest and various expenses, 351.5 fr. (£5.12*s.* 6*d.*); less grazing and faggots, 60 qls. per ann. = 120 fr. (£1.18*s.* 6*d.*), total 180 fr. (£2.17*s.* 6*d.*): 171.5 fr. (£2.15*s.*).

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(1) In this district they are drawn by oxen. (*Ed.*)

Cost to end of eleventh year, 2744.6 fr. (£44).

Cost during twelfth year, including cutting. — Interest and various expenses, less grazing, 152.2 fr. (£2.9*s.*). Cutting, and grubbing roots, 1000 fr. (£16); odd expenses (to make a round sum) 103.2 fr. (£1.13*s.*): 1255.4 fr. (£20.2*s.*).

Total expenses: 4000 fr. (£64.2*s.*).

Receipts.

1000 poles averaging 5 qls, (400 av. 10 cwt.); *i. e.* 5000 qls. at 95c. (200 tons.): 4750 fr. (£76.2*s*).

Faggots, roots, etc., 1500 qls. (57 tons) at 2 fr.: 3000 fr. (£48.1*s.*).

Total receipts: 7750 fr. (£124).

Net return: 7750 — 4000 = 3750 fr. (£60), that is 312.5 fr. (£5) per annum. According to expert opinion this corresponds to a gross yield of 70 to 80c. per annum on the average length of life of a poplar tree.

In Italy poplar is the chief tree used for wood-pulp. In the ten years 1896-1905, the production in Upper Italy rose from 350,000 qls. (34,500 tons) to 700,000 qls. (69,000 tons), and the increase is continuing.

7174 BOOTH-TUCKER. **Eucalyptus Suitable for India.** — *The Indian Agriculturist*, Vol. XXXVI, No. 7, p. 207. Calcutta, July 1, 1911.

With a view to encourage and popularise the cultivation of the Eucalyptus in India, it is suggested:

British India

1) That nurseries should be established in as many places as possible for the cultivation and distribution of young plants of suitable varieties.

2) That the Forest, Canal and Railway Departments be encouraged to establish plantations.

3) That Agricultural Farms and Colleges and Districts and Municipal Boards should have their special attention called to the matter.

4) That an Annual Arbour Day Celebration be fixed on a date suitable for each Prov nce or locality, when this and other valuable varieties of trees may be planted by school children.

5) That the cooperation and assistance of the Press be invited.

6) That a Eucalyptus Association be formed for the purpose of pushing the cultivation of the Eucalyptus.

7) That special concessions and grants of land be made to persons, companies, societies, vllages, or associations willing to establish at their own expense nurseries, groves, avenues, or plantations of Eucalyptus.

Study on the Tans of the Belgian Congo. — *Bull. Agricole du Congo belge*, vol. 88, No. 3, pp. 419-426. Bruxelles, Septembre, 1911. **3175**

Results from the analysis of two series of tans, one coming from the environs of Eala, the other from the environs of Mondombe (Equatorial district).

The examination of the first series was made by Mr. Ed. Nihoul, of the University of Liege, the second series is the object of a report by Dr. Ranwez of the University of Louvain. **Belgian Congo**

The species producing tans are designated in general by their indigenous names, their scientific determination either not having yet been terminated, or being impossible to make.

The tans from Eala are indicated, together with their percentage of tannin, in the following manner: " Sowlolo " or " Isangi " (12.51); *Albizzia Lebbeck* (10.77) ; " Ikingereke " (13.83) ; " Boôndo " (9.22); " Bokulu " or " Lintiu " (1.93) ; " Bolanga " (7.29) ; " Bondole " (10.30) ; *Terminalia Catappa* (23.44) ; " Rosala " (9.00) ; " Bonjolo " (11.07) ; " Bokalaka " or *Carapa procera* (12.40) " Bempanza " (12.84) ; " Wenge " (11.82) ; " Bofali " (7.71) ; " Boâla " or *Pentaclethra macrophylla* (11.00); " Bombambo " or *Musanga Snithii* (4.63); " Boembe " (11.70) ; " Botaka " (10.12) ; " Banja " (9.71).

Many of these products are therefore available in the tannery. *Terminalia Catappa* competes in every possible way with other materials rich in tannin. Of the others a certain number might be used on the spot for the manufacture of tannic extracts. For this purpose are especially adapted the " Bempanza ", the " Bokalaka " and the " Wenge " which, while they have over 12 % of tannin are easily worked for manufacturing purposes, and their *non-tannin* con-

tains but little colouring matter. On the contrary the use of the " Sowlolo " cannot be remunerative. The " Ikengereke " must be treated at a temperature not exceeding 79° C., as the solution obtained ar 100° C. remains cloudy.

The analysis by Dr. Ranwez were carried out following the *international method adopted for the analysis of tanning materials by the International Association of chemists of the Leather Industries.*

The denomination of the barks analysed and their percentages in tannin are the following : " Ileko " 6.02 ; " Bolombelembi " 0.61 ; " Molonkoto " 3.42 ; " Bosenge na maj " 2.65 ; " Boala " 12.47 ; " Waka " 2.62 ; " Bokongo " 6.51 ; " Likaj " 6.65 ; " Bololo " 2.12 ; " Bosenge na mokili " 2.66 ; " Bokungo " 1.68 ; " Lokingo " 2.86 ; " Mondenge " 2.23 ; " Wele " 0.94 ; " Iliko " 7.61 ; " Lomona " 0.0 ; " Monkuru " 6.02 ; " Okvakoka " 12.49 ; " Elese " 3.15.

These results show that the barks of the " Boala " and of the " Okvakoka " might be utilized. Those of " Ileko ", " Bokungo ", " Likaj ", " Iliko " and " Monkuru " give dry extracts containing from 50 % to 60 % of tannin, which might be prepared on the spot.

The wood, fruit, or the gall-nuts of tannin-plants, being often richer in tannin than the barks, it would be interesting in the case of the 18 kinds analysed, with the exception of " Lomona ", to examine the composition of their wood, fruits or gall-nuts.

3176 PURAN SINGH. **Note on the Best Season for Collecting Myrabolans as Tanning Material.** — *The Indian Forester,* Vol. XXXVII, No. 9, pp. 509-512. Allahabad, September 1911.

The writer has examined the fruits of *Terminalia chebula* (1) collected at different seasons from the same locality, to determine **British India** the best time of year for collecting them, so as to obtain the greatest yield of tannin.

The results obtained by him and given in this paper and the conclusions arrived at by Parker and Blochkey (*Collegium,* 1904, 101) go to show that the classification of myrabolans according to mercantile practice is erroneous. The fruits that have remained longest on the tree, *i.e.*, those quite ripe should be classed as the richest in tannin, irrespective of their colour.

(1) A large, deciduous tree abundant in Northern India from Kumáon to Bengal and southward to the Deccan table-land. The tree yields a gum. The dried fruits form the " chebulic " or " black " myrabolan of commerce, one of the most valuable of the Indian tanning materials (G. WATT, *Dictionary of the Economic Products of India.* London-Calcutta). (*Ed.*).

Spanish Law of July 7th 1911 concerning Development of Forestry and Fisheries. 3177

This Law lays down that "the Government shall establish, within three months, a plan for the development of the resources of Forestry and Fisheries"; this will include: Spain

1) Reafforestation; building of foresters' houses; formation of footpaths, roads, and fire-breaks; carriage of timber from the mountains.

2) Delimitation, placing of boundaries, and listing of mountains requiring protection, according to the law of June 28th, 1908.

3) Consideration and formation of plans of classification of mountains belonging to the State, and improvement of those already classified.

4) Improvement of the conditions of water-supply in forests, alteration of the courses of streams, consolidation of dunes, etc.

5) Re-stocking of waters with fish. These provisions must be carried out within ten years. The Council of Ministers will be required to give its consent to the part to be carried out each year.

Rubber Plantations in Ceylon. (Ueber Plantagengummi). — *Gummi-Zeitung*). 29. September 1911. 3178

The output of rubber ought to increase very considerably in the next few years, as a great number of trees are just coming into bearing, while those already bearing will increase their yield. The production of latex, however, generally does not come up to expectation, as many of the trees already in bearing fall off in yield, and require a period of rest. So there is not likely to be either a shortage or over-production of rubber in the near future. Ceylon

In the first six months of 1911, 2 270 565 lbs. of rubber were exported from Ceylon, against 1 087 620 lbs. in the same period in 1910. A third of this represents re-exports of rubber from the Federated Malay States.

The rubber is destined for the following countries:

England	1 190 006 lbs.
Belgium	174 888 »
Germany	8 560 »
Italy	3 597 »
United States	845 946 »
Japan	20 556 »

3179 SEATON WINTON. **Rubber Cultivation in East Africa** (1). (Ueber Kautschukanbau in Ost-Afrika). — *Gummi-Zeitung*, 26 J., Nr. 2, S. 51. Berlin, 13. Oktober 1911.

East Africa

The best rubber plant for East Africa is *Manihot Glaziowii*. There are also some plantations of *Hevea*, which is well spoken of and has a great future.

The maximum number of *Hevea* trees to be planted per acre is 100; but 60 to 75 is best. Under favourable conditions *Hevea* may begin to yield at five years. In Uganda, where the cultivation areas are high and not very damp, incisions should not be made for seven years. Too early tapping is dangerous. To avoid disease, great care must be taken of the plants; all old stumps and roots should be had up and burnt. A good preparation is to drain and sow leguminous plants, to be turned in later as green-manure. Mixed cultivation should not be tried, except in the very richest soils, where coffee may be taken. The incisious should be made on only one-sixth of the trunk.

Manihot Glaziowii may be planted at 430 to the acre. It begins to yield at two-and-a-half years. Not more than a quarter of the trunk should be used for incisions.

Labour is a difficult problem; except in Uganda, it is difficult to get men anywhere in East Africa, either German or British.

3180 **Rubber Cultivation in the Belgian Congo.** — See above Abstr. 3098.

3181 P. SCHIDROWITZ. **Rubber.** (Methuen and Co. Ltd. London, 1911). — Reviewed: *Nature*, Vol. 87, No 2185, p. 348. London, 14 September 1911.

Great Britain

The first nine chapters, half the book, are of special interest to the lay reader, and are based, as the writer points out in his preface, upon six lectures delivered by him in 1910 at Finsbury Technical College. The historical sketch in chapter i., and the two following chapters on production and consumption, and the general nature of the rubber industry, will be found most useful. The notes

(1) See Abstrs. 186 and 187, *Bull.* Jan. 1911; and Abstr. 1212, *Bull.* April 1911. (*Ed.*)

on wild, and what the Mr Schidrowitz terms industrial rubbers, suffer somewhat from his lack of personal acquaintance with the actual conditions abroad. For instance, in dealing with bark-crushing, no distinction is made between the East African scrub vines with semi-fluid latex, and the larger dense forest vines in which the latex is thin and watery; nor are the paragraphs dealing with *Castilloa elastica* and *Funtumia elastica* free from misconceptions.

The chapter on the plantation industry is a book in itself, and will be read with the greatest interest. While laying no claim to being able to treat this truly extensive subject " in encyclopaedic fashion ", the writer is to be congratulated upon the way he has singled out salient points. Under the heading of " Competition from other Sources ", we read: " The first rubber to go will undoubtedly be that which is not prepared in a cleanly fashion. " Africans " as we know them now will be a thing of the past, and that very shortly. It does not, however, follow that the rubber forests of Africa will no longer furnish their quota to the world's supply. On the contrary, it seems to me that the system of rationally working forest areas on semi-plantation lines... is likely to be extended.

Mr Schidrowitz is very well known as a rubber chemist, and in the second half of the book he finds himself, as it were, on more congenial soil. In dealing with the chemistry of rubber, theory of vulcanisation, manufacture of rubber goods, substitutes and waste-rubber disposal, much new matter is introduced which is likely to be invaluable, not only to the general reader, but to the manufacturer and the chemist. The importance of the waste rubber industry is emphasised, and in this connection the author says: " If we assume that the crude rubber employed in the manufacture of goods in the British market yearly amounts to 12 000 tons, and this reappears in the shape of finished rubber articles. containing on the average perhaps not more than 30 per cent of rubber, it is plain that there must be something like 30 000 to 40 000 tons of waste rubber annually. Of this, perhaps, one-half is recoverable; the remainder actual waste.

The chemical analysis of both vulcanised and raw rubbers, mechanical tests, and kindred subjects are also dealt with at length, while at the end of the book is an appendix of ten pages dealing with the wording of contracts and specifications which might also be described as interesting reading, which says much for the author's happy style of literary construction.

3182 **Gum Copal** (La Gomme Copal. Note rédigée à l'aide des renseignements fournis par feu F. SERET). — *Bull. agricole du Congo Belge*; Vol. II, N. 3, pp. 389-393. Bruxelles, Septembre 1911.

In the Belgian Congo copal comes from *Capaifera Demeusei* Harms, and perhaps some other undetermined species; on the west Coast of Africa it comes from *C. copallina*; on the East Coast and in Madagascar from *Hymenea verrucosa*, and in America (Guiana, Venezuela, etc.) from *H. Courbaril* L.

Belgian Congo

Copaifera Demeusei (called " Baka " in the Equator district) occurs in the forests fringing the numerous rivers and streams in the districtis of the Equator, Lake Leopold II, Bangala, Ubangi, Middle Congo, Kasaï, Stanleyville, Aruwimi and Lower Congo. It occurs here and there in the forests, chiefly in marshy places. It might be planted in marshy or periodically-flooded land.

" Green copal " is collected from the trees, while " fossil copal " is found in the ground, resulting from the decay of former trees. A fossil copal, called " dangi " by the natives, occurs in the district of the Equator, particularly at Busira. The Belgian Congo natives only collect naturally-exuded copal; in Guinea it is obtained by incisions.

Copal-trees do not yield till the seventh or eigth year, when they have reached 5 to 6 in. in circumference. The yield of a tree is very variable, depending on age, extent of cutting, and exposure; the first yield from a 10-year-old tree is about 200 gms. (7 oz.); a full-grown tree will give 1 kg. (2.2 lbs.).

The natives get out the more obvious impurities (*e. g.* pieces of bark, earth, insects) from the resin. It sometimes undergoes some preparation before being shipped to Europe. The soft gums are separated from the hard ones and the latter are placed in 1 % caustic soda for about half an hour, they are then washed in water and dried in the sun. The Belgian Congo exports amounted to 938,698 kg. in 1904, 1,618,895 kg. in 1908, and 975,511 kg. in 1910. (1000 kg. = .984 ton). The price varies according to quality from 1 fr. 40 to 3 fr. 55 the kilo. (6*d.* to 1*s.* 3*d.* the pound).

The natives only use copal for lighting. In Europe it is used in the manufacture of varnish.

According to the natives there are various types of copal-trees giving white, yellow or red copal.

Live Stock Breeding. — Aviculture etc. Animal Industries.

Report of the International Commission on the Control of Bovine Tuberculosis 1910. — *Department of Agriculture, Canada. — Health of Animals Branch.* Government Printing Bureau, Ottawa, 1911, p. 8. 3188

Resolutions.

Based on the information contained in the reports of its committees and on such other information as was brought out in the general discussions of the Commission, the following resolutions were adopted by the international Commission on the Control of Bovine Tubercolosis. Canada

1. — *Dissemination.*

As a general policy to be observed, all contact between tuberculous and healthy cattle and stables, cars, &c., which may contain living tubercle bacilli should be prevented. To accomplish this the following specific recommendations are made:

1) There should be no sale or exchange of animals affected with tuberculosis except for immediate slaughter or for breeding purposes under official supervision.

2) That the managements of live-stock shows should give preference to cattle known to be free from tuberculosis, either by providing special classes for such cattle or in some-other practical way, and should also take every precaution to prevent contact between such animals and those not known to be free from disease.

3) All live-stock shippers should take every precaution to see that cars furnished are throughly cleansed and disinfected before use.

2. — *Tuberculin Test.*

1) That tuberculin, properly used, is an accurate and reliable diagnostic agent for the detection of active tuberculosis.

2) That tuberculin may not produce a reaction under the following conditions:

a) When the disease is in a period of incubation.

b) When the progress of the disease is arrested.

c) When the disease is extensively generalized.

The last condition is relatively rare and may usually be detected by physical examination :

3) On account of the period of incubation and the fact that arrested cases may sooner or later become active, all exposed animals should be retested at intervals of six months to one year.

4) That the tuberculin test should not be applied to any animal having a temperature higher than normal.

5) That any animal having given one distinct reaction to tuberculin should thereafter be regarded as tuberculous.

6) That the sub-cutaneous injection of tuberculin is the only method of using tuberculin for the detection of tuberculosis in cattle which can be recommended at the present time.

7) That tuberculin has no injurious effect on healthy cattle.

3. — *Evidence from Tuberculin Test.*

That a positive reaction to tuberculin in any properly conducted test, official or otherwise, in any animal, in any herd. shall be considered evidence sufficient upon which to declare the herd to be infected.

4. — *Compulsory Notification.*

That this Commission recommends the passage of legislation providing for the compulsory notification by owners and by veterinarians of the existence of tuberculosis in a herd, whether such existence be made known by detection of clinical cases or by the tuberculin test.

5. — *Location through Slaughter.*

This Commission recognizes that the discovery of tuberculosis, in animals slaughtered for food purposes, furnishes one of the best possible means of locating the disease on the farm, and therefore recommends the adoption of some system of marking, for purposes of identification, all cattle three years old and over, shipped for slaughter.

As tuberculosis of hogs is almost invariably due to bovine infection, this recommendation should also be made to apply to hogs of any age shipped for slaughter.

It is further recommended that the discovery of tuberculosis in animals coming under government inspection should be used whenever identification is possible, as a means of locating infected herds and premises. All such cases should be reported to the proper authorities for control action.

6. — *Disposition of TuberculousAnimals.*

The Commission Plan. — 1) As a general policy in the eradication of tuberculosis the separation of healthy and diseased animals, and the constrnction of a healthy herd are recommended.

In order to accomplish this, the following recommendations are made :

I. — If the herd is found to be extensively infected, as shown by the tuberculin test or clinical examination, even the apparently healthy animals in it should be regarded with suspicion, until they have been separated from the reacting animals for at least three months.

If, after the expiration of this time, they do not react to the tuberculin test, they may be considered healthy and dealt with accordingly.

It is recommended that a herd extensively infected should not be treated by the method of general separation, but that the construction of a new herd from the offspring only is advisable.

2) If the herd is found, by either, or both, of the above methods, to contain a relatively small proportion of diseased animals, separation of the diseased animals from the healthy animals, and the construction of a sound herd from the healthy animals, and the offspring of both is advocated.

As a working basis in carrying out these principles, we advise:

a) That herds containing 50 per cent or more of diseased animals be treated as coming under section 1.

b) That herds containing under 15 per cent of diseased animals be treated as coming under section 2.

c) That herds falling between these figures be graded according to the option of the owner.

d) That it shall be the prerogative of the owner to reject either plan and have his herd dealt with by removal and slaughter of diseased animals, with or without compensation, according to the public policy in operation.

II. — That when by any means the officials properly charged with the control of tuberculosis become aware of its existence in a herd, to which a policy of slaughter and compensation cannot reasonably be applied, such herd must be dealt with by the owner,

under Government supervision, on the principle of the separation of all sound animals from those affected. Such separation must be effected by treating the whole herd as diseased aud rearing the calves separately, either on pasteurized milk or the milk of healthy cows, or when the number of those affected is so small as to warrant such a course, by the application to the whole herd, from time to time, under official supervision, of the tuberculin test, and the entire segregation of all animals found to react.

In the event of any owner refusing or neglecting to adopt either of the above methods, his entire herd to be closely quarantined, and sales therefrom to be entirely prohibited.

3) That a policy of compensation be recommended as useful and usually necessary as a temporary measure.

4) That when slaughter is necessary, in order to avoid economic loss, every effort should be made to utilize as far as possible the meat of such animals as may be found fit for food on being slaughtered under competent inspection.

5) The details of the Commission Plan will be found fully set forth in the Appendix to this report.

7. — Prevention.

1) That with the object of preventing the spread of infection, persons buying cattle for breeding purposes or milk production should, except when such purchases are made from disease-free herds, which have been tested by a properly qualified person, purchase only subject to the tuberculin test. In order to assist in the proper carrying out of this suggestion, the Commission recommends that official authorities should adopt such regulations as will prevent the entry to their respective territories of cattle for breeding purposes or milk production unless accompanied by satisfactory tuberculin test charts.

2) That all milk and milk by-products used as food should be properly pasteurized, unless derived from cows known to be free from tuberculosis.

8. — Control of Tuberculin Test.

That the Commission recommends the passage of legislation which will prevent the sale, distribution or use of tuberculin by any persons other than those acting with the full knowledge, or under the direction, of official authorities.

9. — Education.

As a clear knowledge of the cause and character of tuberculosis among animals, the modes of dissemination and its significance

as an economic and as a public health problem, underlie an intelligent adherence to the principles that must be observed in all efforts for eradication, as well as the establishment of proper co-operation in the great work between physicians, veterinarians, livestock owners, legislators, and the public generally, it is recommended that a widespread campaign of education be undertaken. To accomplish this end it is recommended that, first of all, a simple pamphlet on bovine tubercolosis be written, in which the language used shall be of such character that every person of average intelligence shall be able to read it without being mystified by technical terms or phrases. This pamphlet should be published with the endorsement of the American Veterinary Association and the special endorsement and consequent authority of the International Commission on Bovine Tubercolosis Control.

10. — *Publicity.*

In concluding its work the Commission desires to especially appeal to the press, metropolitan, agricultural, and local, to join in the work of extending as much as possible among the people the conclusions here arrived at. The vital importance of the life of farm animals to the welfare of all classes of society needs no argument in its support.

11. — *Legislation.*

It is recommended that legislation regarding the control and eradication of tuberculosis among domestic animals be made uniform; that the laws of the United States and Canada and other American countries, for the admission into America of animals from without, be made stringent and as much alike as possible; and that the laws governing the interstate and interprovincial movement of cattle and that between different American countries be harmonized.

I. Peters. **The Royal Agricultural Society's Show at Norwich.** (Die Wanderausstellung der " Royal Agricultural Society of England " in Norwich). — *Illustrierte Landwirtschaftliche Zeitung,* Nr. 84. Berlin, 21. October, 1911. **3184**

The horses were the most important feature of this show. There were 103 Shires which, as a whole, were remarkably fine and of spirited bearing, but with too strongly developed fetlocks. The Suffolks were full bodied, inclining to the Belgian type. **Great Britain**

The Clydesdales were found generally defective in formation, but more especially so in the case of the hoofs. The Hunters, on the other hand were of striking beauty.

The bovine race was most worthily represented by Shorthorns fattened to their utmost capacity.

The Herefords, though less fat, were more full-bodied than the Shorthorns. The greatest success of the Show was undoubtedly the Aberdeen-Augus breed, rounded in form, massive and muscular, which made the most favourable impression of any.

A special class of milk Shorthorns comprised none but very moderately-yielding cows.

Those breeds solely kept on account of their milk bearing properties, such as the Jerseys, Guernseys, Ayrshires and Kerrys, shewed signs, for the most part, of degeneration caused by the extreme tendency to increase the production of milk.

It must be noted that the animals exhibited were carefully prepared. By this means the task of the judges is rendered easier, and the cattle themselves appear to better advantage.

Lastly, we further note that the judges used neither catalogue nor score-card for their work. They began by eliminating the animals of inferior quality, so as to choose the best out of a smaller already selected group.

The judges were few in number; in many cases only one individual for each class.

3185 O. HAGEMANN. **The Respiratory Calorimeter at Bonn, with some Experiments made in it on two Oxen and a Horse.** (Das Respirations-Calorimeter in Bonn und einige Untersuchungen mit demselben bei zwei Rindern und einem Pferde). — *Landwirtschaftliche Jahrbücher, Band XLI Ergänzungsband I.* Berlin, 1911.

Germany

Prof. Hagemann, in his attempts to investigate the science of alimentation in the case of our domestic animals, has constructed a respiratory calorimeter to determine the amount of the food assimilated whose potential energy is transformed into heat in the body of the animal.

Investigations of this nature were made on an ox in 1909 and 1910, and on a horse in 1911. By added chemical examination, Prof. Hagemann obtained results indicating what part of the total amount of food had been digested and assimilated by the animals experimented on. The basal ration of these animals was chiefly hay of different qualities; but during a given period they received other

kinds of food. Each of the animals in question was kept several times and from 4 to 6 days in the calorimetrical chamber.

The author has deduced from his experiments that a great difference of nutritive value exists between one and another kind of hay differing very slightly in chemical composition, but entirely so in botanical nature. This difference was specially marked in the experiments upon the horse, and Prof. Hagemann concludes from it that the facility of digestion in horses largely depend on the kind of forage they eat. And so he proposes making a botanical analysis of different hays, so as to be able to give an opinion as to their value.

The writer intends to continue studying the question which he does not yet consider sufficiently elucidated.

T. B. Wood. **The Chemistry of the Proteins.** — *Trans. of the Highland and Agric.Soc. of Scotland*, Vol. XXIII, p. 84. Edinburgh, 1911. **3186**

The proteins of any particular species of animal appear to have a definite composition, that is to say, they contain the various amino-acids in definite proportions peculiar to themselves. Presumably, therefore, the animal will require to be supplied with these animo-acids in definite proportions. If the animal receives a diet in which the proteins contain an excessive amount of any particular animo-acid, the excess of this substance above the definite proportion required will not be utilised, but will be transformed into one or other of the various forms in which the animal excretes its nitrogen, and thus excreted in the urine without the animal receiving any benefit from it. In other words, if the proteins contained in a diet do not yield on digestion a mixture of the constituents for repair of the animal's tissues in the right proportion, the quantity of protein necessary for the animal will be that quantity which supplies enough of the constituent present in the smallest proportion. This quantity will supply far too much of some of the constituents, the excess of which above that required by the animal will go to waste. **Great Britain**

Obviously the quantity of protein necessary for an animal will vary consiberably, being smaller the nearer its composition approaches to that of the protein of the animal's tissues. An animal ought therefore to require the minimal amount of protein if that protein be supplied in the form of the flesh of its own species. This has been shown to be the case with dogs, which maintain their weight on far less protein supplied as dog flesh than if their protein be supplied in any other form. Now it would be impossible to feed farm

stock on their owu flesh for obvious reasons, but in their case protein could doutless be economised in another way.

Farm stock nearly always receive a mixed diet, the constituents of which can be varied within certain limits. Attention has already been drawn to certain facts which show that certain mixtures of feeding-stuffs produce better results than other mixtures containing about the same amount of protein. The reason of this is doubtless that in the mixtures which are more than ordinarily successful, the proteins of the several ingredients of the diet are complementary to each other, one being rich in the amino-acids in which the others are deficient, and the mixture, therefore, having about the right composition to suit the animal. At present the information to hand about the composition of the proteins of feeding-stuffs commonly used on the farm is very incomplete, and does not enable the chemist to predict mixtures which ought to be successful. The common basis of the diet of stock on the farm is home-grown prodnce, such as roots, straw, and hay. Cake or meal of various kinds is purchased to supply the protein and oil in which the above home-grown foods are deficient. Practical men often know from former experience that good results are obtained from certain mixtures, and buy cake or meal accordingly. There is also a certain amount of experimental evidence available, such as that already quoted. As a rule, however, the kind of cake or meal purchased is dictated by such considerations as cheapness or accessibility.

Under these circumstances the more numerous the ingredients contained in the diet the more likely is it to give successful results. In other words, an animal should maintain itself on less protein the greater the number of ingredients contained in its diet, for the greater the number of ingredients the more likely are the various proteins to be complementary to each other. To test this point, advantage was taken of the extremely useful papers on the Feeding of Cattle and Sheep by Mr Herbert Ingle, which have recently appeared in the last two volumes of these "Transactions". From all the experiments therein collected the following figures were calculated:

No. of ingredients in diet, meadow-hay being counted as two grasses and clovers	Pounds of digestible nutrients calculated as starch equivalents required to give 1 lb. of live-weight increase.	
	Cattle	Sheep
3 or under	10.2	7.2
4 or over	8.9	6.75

It is clear from these figures that the diets containing many ingredients produced considerably more live-weight increase per lb. of food digested.

A practical point arises in the case of certain proteins or protein-like substances which are entirely deficient in certain constituents absolutely necessary to animals. The most interesting of these is zein; the protein of maize. This protein contains no tryptophane, and tryptophane is one of the constituents necessary to animals. Now, zein should be incapable of maintaining in repair the tissues of an animal, no matter how much protein the animal received in this form. This point has been tested in Cambridge by Dr. F. G. Hopkins, who found that mice were unable to subsist on a diet in which zein was the only protein. If, however, a small quantity of the missing constituent, tryptophane, was added to the diet, they throve as well as animals will do on a purely artificial diet.

An experiment similar to this was carried out some time ago with the protein-like substance gelatine, which resembles the proteins in many ways, but contains no tyrosine and no tryptophane. The experiment consisted in feeding two lots of animals on a diet containing an insufficient amount of protein, which was supplemented in one case by gelatine, in the other by gelatine and a small amount of tyrosine. The experiment was carried out before tryptophane was discovered. It was consequently incomplete, as tryptophane should have been added as well as tyrosine. Nevertheless, the addition of tyrosine markedly increased the efficiency of the gelatine in taking the part of protein in the animals' diet.

These experiments, while not being practical in the sense that it would be possible to improve the feeding value of maize or gelatine by addition of tryptophane or tyrosine, nevertbeless prove conclusively that an animal requires certain amino-acids, and cannot exist on proteins which do not supply them; and this naturally leads on to another point.

Even the few results which have already been accumulated have made it possible to predict that the addition of the amino-acid tryptophane to the protein of maize would enable animals to utilise that protein, and this prediction has been shown to be correct in the case of mice. Such a success promises well for the future, and it is to be hoped that British chemists wlll not remain behind those of Germany and America in pursuing so interesting and important a line of investigation. The question of energy value appears to be well worked out; the next great economic advance in the science of feeding will almost certainly come in the saving of protein on the lines indicated.

3187 H. T. CRANFIELD. **The Effect of Feeding Cocoanut Cake and Linseed Cake on the Composition of Butter-Fat.** — *The Analyst*, London, September, 1911.

Great Britain

According to the results obtained, at the Midland Agricultural and Dairy College, during a feeding experiment of dairy cows, of the cross-bred Shorthorn type, the feeding of cocoanut cake produced a butter which gave a refractometer figure below the normal, while the Polenske number was very high. The Reichert-Meissl number was, however, quite normal. Feeding with linseed cake influenced the butter in respect of the Polenske number, butters from this source giving a figure much below the normal. The refractometer figure was also influenced, a distinct rise being noticeable. Cocoanut cake produced a butter of good quality, possessing better keeping properties than butter from linseed or cotton cake. The Shrewsbury and Knapp method for detection of cocoanut oil in butter possesses practically no advantages over the Polenske method.

These results are in accordance with those obtained by H. Lührig, who recommended an increase of 0.8 in the limits adopted by Polenske for genuine butters in his original paper in 1904.

3188 C. DUSSERRE. **Oat Straw as Forage** (La paille d'avoine comme fourrage). — *La Terre Vaudoise*, 3e Année, No. 41, pp. 376-377. Lausanne, 14 octobre 1911.

Switzerland

As was to be foreseen, in consequence of the premature ripening of the oats owing to the drought of 1911, a large proportion of the alimentary principles of the plant, unable to pass into the grain, remained in the straw, thus rendering it more nutritive than usual. To ascertain this fact, the writer had the analysis made of two of this year's crops of oats; one of which, grown at Apples, had obtained the normal degree of maturity, whilst the other, from Champsec in the valley of Bagnes (Valais), had been scorched by the exceptional drought.

The following is the result of the analyses:

Yield.

	Kg. per hectare		Proportion of grain	Lbs. per acre	
	Grain	Straw	%	Grain	Straw
Apples	3830	5130	43	3408	4565
Champsec	1010	3700	21	898	3293

Composition of the dry matter of the straw:

	Apples %	Champsec %
Fat	2.8	3.7
Proteides	2.8	5.5
Carbohydrates, etc.	47.8	43.6
Fibre	40.1	37.8
Ash	6.5	9.4

Quality of the grain.

	Weight per hl.		Weight of 1000 grains			
		per bushel	Whole grains		Husked grains	
	kg.	lb.	grams	oz.	grams	oz.
Apples	50	40	34.25	1.198	24.20	0.847
Champsec	46	36.8	22.65	0.792	15.60	0.546

O. v. Czadek. **Experiments in feeding Cattle with Crushed Vine-canes.** (Fütterungsversuche mit zerkleinertem Rebholz). — *Zeitschrift für das Landwirtschaftliche Versuchswesen in Oesterreich,* XIV. J., H. 9, pp. 1104-1114 + tbl XII. Wien, September 1911. **3189**

Experiments made for the provincial Committee of Lower Austria at the laboratory of the Viennese agricultural station. The author made practical experiments in feeding horses, oxen and cows, as well as other exact experiments on cows alone. In the rations fed crushed vine canes were substituted for chopped straw. **Austria**

From these experimeuts the Author deduces:

1) That there is no difficulty in feeding crushed vine canes.

2) As a general rule the animals eat them readily.

3) The effect of feeding animals with vine-canes has been proved to be poor and inferior to that of feeding with straw.

4) That vine-canes can hardly be regarded as forage.

5) As regards the utilisation of vine-canes during years of a dearth of coarse forage, the best method is to use them in conjunction with an increased amount of concentrated food. But in any case the labour entailed in crushing the canes, even by machinery, must be taken into account, as, if it be costly, no advantage is to be derived from the use of vine-canes.

The results of the experiments in question give the following ratio of utilisation.

	Straw	Vine-canes	Difference
Dry matter	66.3=69.6	57.5=67.7	−8.8= − 1.9
Organic matter	67.2=70.8	58.3=68.5	−8.9= − 2.3
Albuminoids	71.4=72.1	63.0=73.0	−8.4= + 0.9
Fat	71.2=70.7	64.2=70.8	−7.0= + 0.1
Carbohydrates	75.8=75.0	68.4=72.6	−7.4= − 2.4
Fibre	57.4=65.4	43.6=61.0	−13.8= − 4.4
Ash	43.7=55.2	45.1=54.0	+1.4= − 1.2

3190 FORGWER. **Value of Acorns for Feeding Live-Stock.** (Der Wert der Eicheln als Futtermittel). — *Landwirtschaftliche Umschau*, Nr. 40, S. 948. Magdeburg, 6 Oktober 1911.

The feeding-value of acorns is calculated as follows:

	Per quintal	Per ton
Fresh, not shelled	8,16 marks	£4. 1*s*. 6*d*
Fresh, shelled	11.98 »	£5.19*s*. 3*d*.
Dried, not shelled	14.62 »	£7. 5*s*. 6*d*.
Dried, shelled	15.90 »	£7.18*s*.

Acorns can be fed dried or fresh, but it is better to shell them for drying as they keep better; shelled acorns are eaten more readily by stock, as they are less bitter.

Germany

The following daily rations may be given, but the amount must be brought up gradually to begin with:

	Fresh		Dried	
Horses	4.5 kg.	10 lb.	2,8 kg.	6.2 lb.
Milch-cows	4.5 »	10 »	2.8 »	6.2 »
Fattening and working bullocks	6.0 »	13.2 »	3.7 »	8.1 »
Pigs	1,5 »	3.3 »	1.0 »	2.2 »
Sheep and goats	0.75 »	1.6 »	0.5 »	1.1 »

Naturally acorns are much best for pigs, and in their case there is no fear of any harmful influence on the meat or fat.

S. v. NATHUSIUS. **Results obtained in Germany by crossing Varieties of the European Cattle with the Zebu (*Bos indicus*) of India and Africa** (1). (Die Züchtungen mit Buckelrindern (*Bos indicus*) aus Indien und Afrika). — *Kühn Archiv.*, Band I, erster Halbband, pp. 225-252. Berlin, 1911. 3191

Statement of the results obtained at the Zoological Garden of the School of Agriculture connected with the University of Halle in breeding cattle produced by crossing varieties of the European bovine race with the Indian and Africain Zebu. Germany

36 male and 36 female Zebu hybrids, 8 male and 10 female Sanga hybrids are registered in the principal table.

In considering the advantage of introducing Zebu blood for the improvement of our native races of cattle, the Author remarks that if the products obtained have the advantage of being of enormous size, their legs, on the other hand are too long and the chest narrow; in fact, in his opinion, the animals are defective. But it appears that Zebu blood encourages a fattening tendency. The influence of this blood on the fat-content of the milk must also be taken into consideration. But the production of milk in hybrids is small as compared with that of the mother cow. As a whole the influence of Zebu blood does not seem to be of much practical importance in Europe.

At the same time the question has another aspect when looked at in relation to the colonies.

S. v. NATHUSIUS. **Results obtained in Germany by crossing Varieties of the European Cattle with the Gayal (*Bibos frontalis*)** (1). (Die bisherigen Ergebnisse der Kreuzungsversuche mit dem Gayal (*Bibos frontalis*) im Hausthiergarten des Landw. Instituts der Universität Halle). — *Kühn Archiv.*, Band I, erster Halbband, P. 61-105. Berlin, 1911. 3192

Account of the results so far obtained at the Zoological Garden of the School of Agriculture connected with the University of Halle by crossing varieties of European cattle with the Gayal (*Bibos frontalis*). These experiments, begun in 1880 with two Gayals sent to this School from the Zoological Society of Calcutta, proved the Germany

(1) See Abstr. 220, *Bull.* Jan. 1911; Abstr. 2765, *Bull.* Aug.-Sept.-Oct.1911. (*Ed.*),

union of the two races to be productive of great fertility. But they at the same time strengthened the hypothesis that the Gayal is only fit for reproduction at certain periods. This periodicity has been frequently observed in the case of animals in a wild state. The total number of hybrids reared is 140, and as animals have also been obtained having two quarter only of Gayal blood, the fertility of the union of the Gayal with domestic animals of this race may be affirmed as an undoubted fact. The question is now being asked how far this relationship between *Bos taurus* and *Bibos frontalis* will be confirmed by investigations of another nature, i. e. by investigations as to the reaction of the blood. One general and sixty special tables of results are g ven as well as information regarding negative experiments.

The following are the principal races used in the production of these cross-breds : Shorthorn, Jeverländer, Simmenthal, Oldenburg, Dutch and Prätigauer.

3193 J. WRENFORD MATHEWS. **Sheep and Wool for the Farmers. The question of Mutton. The Raising of the Early Lamb.** — *The Agricultural Gazette of N. S. Wales*, Vol. XXII, Part 8. Sydney, August, 1911.

Early maturity and uniform body development are the great requirements in New South Wales, therefore farmers must turn their attention to the breeds that possess those characteristics in a more or less marked degree. The various breeds of sheep fall naturally into three clearly distinct groups : the Merino, the Long-wools and the Downs. It is from one or other of the Downs that the most valuable type of early maturing lamb can be evolved. The Down breeds comprise South Down, Shropshire, Hampshire, Oxford Down, Suffolk and Dorset Horn. The South Down yields the maximum quantity of prime mutton and at the same time the minimum amount of bone, of any sheep in proportion to its total body weight. Moreover, the South Down yields a class of mutton which in contrast to the coarse, tallowy flesh of the Lincoln, is of the finest texture and sweetest flavour. The natural tendency of the South Down and its derivatives is to lay on flesh and mature rapidly while the Lincoln is a much slower maturer. On the other hand the wool of the Lincoln is characteristically long and lustrous ; that of the South Down is short and fine in diameter of fibre. In consequence of its heavy lock and length of staple, the Lincoln can produce upwards of 30 lbs. of wool. The loose open fleece of the South Down may reach at most about one-sixth of that quantity. Lincoln wool

Australia: New South Wales

may be a foot or more in length, South Down seldom exceeds 2 inches. Though the diameter of its fibre is considerably greater than that of the South Down, yet the Lincoln wool possesses greatly increased length in proportion to its increased diameter, and the Lincoln is relatively much more valuable, since it possesses all the characteristics of a true wool sheep. The wool of the South Down, though naturally of finer diameter, is nevertheless deficient, as compared with other wools of equal fineness, in those qualities which would have given it a valuable texture.

The following table of weights shows the wool and mutton producing capabilities of the different breeds :

Breed	Fair Average Stud Sheep		Average ordinary Flock Rams	
« Long Wools »	Body lb.	Fleece	Body	Fleece
Lincoln.	180	28 ½	168	17
Leicester	200	16	160	14
Border Leicester	208	12 ½	185	10
« Short Wools »				
South Down . .	143	6	140	5
Shropshire . . .	192	11	180	11
Hampshire . . .	188	10	177	8
Suffolk	204	9	186	6 ½
Dorset Horn . .	206	8 ½	196	6

The weights given are those of sheep from two to three years old, and the weight of fleece is the twelve months' growth. These figures enable us to form a fairly correct estimate of the distinct characteristics of each breed in connection with the suitability for the production of wool and mutton. The accompanying table of results of experiments carried out at the Wagga Experiment Farm will no doubt throw considerable light on the subject. Here the breeds have been grouped according to their wool and mutton values and the character indicated by showing the weight of body and fleece in the different crosses. The information is supplemented by particulars of the girth, waist and length measurements, as well as of the quality and length of staple of the fleece.

The sheep were kept under the same conditions, and the results are very conclusive. Grouped according to age the results are quite consistent. The breeds used on this occasion have served to contrast slow maturity and extreme early maturity.

The main points for the farmers' consideration are whether 124 lbs. body weight in the Lincoln is as valuable as 136 lbs. body weight in the Dorset Horn—both being at the 4 tooth stage—when the 15 lbs. 12 oz. of the Lincoln's fleece are compared with the

9 lbs. 7 oz. of wool produced by the Dorset Horn. A similar comparison between these sheep at the 2 tooth stage will serve to emphasise the consistency of the results with the laws of breed and early maturity which form primary considerations in all systems of breeding.

For example, if the Lincoln-Merino wether be contrasted with the Dorset Horn-Merino wether, it will be seen that the 18 lb. difference in weight at seventeen months (2 tooth stage) has decreased to 12 lb. a year later. Furthermore, the second crosses show how considerably the employment of the cross-bred ewe (first-cross) has increased the body-weight.

Cross Breeding Experiments with Sheep at Wagga Experiment Farm Showing relative wool and mutton-producing qualities of the crosses obtained by mating different breeds:

BREED	No of Sheep	Age	Body				Fleece		
			Weight	Measurements					
				Girth	Waist	Length	W'ght	Length	Quality
		M'ths.	lb. oz.	in.	in.	in.	lb. oz.	in.	
First cross.									
Wethers.									
Lincoln-Merino	3	17	107 13	36	39	32	12 8	5½	46s-50s
Border Leicester-Merino	4	17	113 12	37	42	33	10 11	5¼	50s-56s
Shropshire-Merino	1	17	103 0	36	39½	29½	10 8	3½	50s
Dorset Horn-Merino	5	17	125 4	38	41½	34	7 3	3	56s-60s
Ewes.									
Lincoln-Merino	10	17	96 9	34	37	31½	11 4	5¾	46s-50s
Border Leicester-Merino	12	17	98 1	35	37	32	9 7	4½	50s-58s
Shropshire-Merino	4	17	101 14	34	38	31	10 5	3½	50s-56s
Dorset Horn-Merino	10	17	102 6	35	39	33	7 2	3	56s-58s
Wethers.									
Lincoln-Merino	4	29	124 12	38½	40	31½	15 12	5¾	44s-46s
Border Leicester-Merino	5	29	129 4	39½	41½	34½	11 12	6	46s-50s
Dorset Horn-Merino	4	29	136 14	40	43	35	9 7	3¼	50s-56s
Second cross.									
Border Leicester-Lincoln-Merino	7	17	127 4	38½	41½	34	10 14	6½	44s-50s
Shropshire-Lincoln-Merino	7	17	115 1	37	40	33	11 12	4	50s-56s
Shropshire-Border Leicester-Merino	2	17	123 10	38	41	34	11 12	4	50s
Hampshire-Lincoln-Merino	7	17	109 6	38	41½	31	10 5	3½	50s-56s
Dorset Horn-Lincoln-Merino	4	17	135 0	39	43	35	8 5	3½	50s-56s
Dorset Horn-Border Leicester Merino	3	17	134 0	38	43	34½	9 8	4½	46s-50s
Border Leicester-Lincoln-Merino	5	29	140 9	44	46	33½	12 9	6	44s-46s
Shropshire-Lincoln-Merino	4	29	129 1	43	44	32	11 3	3½	50s-56s
Dorset Horn-Lincoln-Merino	6	29	148 13	42	45½	34	9 4	4	46s-50s

As the table shows, the results of the Wagga experiments indicate superiority of the Dorset Horn over other breeds in weight of body and early maturity. This superiority is further borne out by the experimental work in cross-breeding at the Roseworthy Agricultural College in South Australia. This shows the suitability of the Dorset Horn under Australian conditions, since both institutions are situated in moderately dry areas.

In the " old country " the Suffolk is prized as an extreme early maturer. With the English farmer it ranks as one of the most popular and profitable of breeds. Australia can already provide a wide choice of breeds yet the Suffolk is too valuable a mutton type to be entirely overlooked. The increased demand of the local market for an early lamb affords an opportunity for turning the special qualities of the Suffolk to advantage in the direction of supplying this local demand. The Oxford and several other Down breeds, though valued in their native country, have never so far attracted any serious attention from Australian breeders. The Hampshire is kept in Australia to some slight extent, but while a fairly useful breed it has not received much support. In brief, then, only the South Down, Shropshire and Dorset Horn call for any extended discussion.

LAPLUME. **The Domestication of Elephants in the Congo** (La domestication des éléphants au Congo belge). — *Bulletin Agricole du Congo Belge.* Vol. II, N° 3, pp. 405-418. Bruxelles, Septembre, 1911. **3194**

Description of the different methods for hunting elephants ; methods of domestication and training adopted by the *Station de domestication des éléphants* of Arpi, Belgian Congo, principal diseases, nourishment and habits of domesticated elephants. **Belgian Congo**

Wild elephants occur all over the Congo territory; in the district of l'Uele they are very numerous. In South and North Africa there are no elephants ; they have been hunted to such a point that they have disappeared, by extermination or migration to other territories. The Governments having colonies in Africa have taken the wise measure of limiting the right of hunting and have also forbidden it in certain regions.

This measure should lead to the foundation of establishements for the capture and domestication of elephants in all these colonies.

3195 J. L. FRATEUR. **Zootechnical Study of the Ostrich.** (Etude zootechnique sur l'Autruche). — *Bull. agric. du Congo belge*, Vol. II, No. 3, pp. 371-389. Bruxelles, Septembre 1911.

In the present richly illustrated study the Author condenses the results of personal observations (made in South Africa and the southern part of the United States) as well as facts gathered from different publications on the same subject.

The ostrich inhabits the steppes and the desert regions of tropical and sub-tropical Africa and Western Asia. In its wild state it is chiefly met with in the Sahara and the Lybian desert, on the steppes of central and southern Africa and in regions of considerable extent in western Asia. Zebras and ostriches are often met with together. In its wild condition, the ostrich chiefly feeds on plants; in captivity its principal food is lucerne. An adult bird can easily be nourished on 24 pounds of the hay per day; but it drinks a great quantity of water.

Africa. Asia. America

Each cock has generally 2 or 3 hens, which lay their eggs in the same nest. Ostriches in liberty usually lay about thirty eggs in the same nest. The period of incubation lasts from 40 to 46 days. In the case of tame ostriches, 42 days is the time required for hatching and they may lay as many as 50 eggs.

The ostrich is easily tamed and accustoms itself easily to climates entirely different from that of its natural habitat. Numerous isolated experiments have been made in the past in various parts of Europe and North Africa (1). The wild ostrich has been hunted from time immemorial for its feathers. From this point of view the arabs of North Africa divide the ostrich into 3 categories: "Edellim" (black jet) the adult cock, "Ribeda" (the gray) the female, and "Hermud" (brownish) the young bird. Ostrich flesh is good for food. It is of a brownish red colour.

Zoologists distinguish four species of ostrich, which are strictly-speaking geographical forms; the crosses are fertile.

1) The common or North-African Ostrich (*Struthio Camelus*) is met with in North and West Africa as well as in the north-east regions, particularly in Abyssinia; it also exists in Arabia and the South of Persia. The North-African Ostrich has been mostly useful

(1) See pp. 133 and 134 *Bull.* Nov. 1910; Abstrs. 927 to 929, *Bull.* March 1911. Experiments in rearing the Ostrich were also made in Italy (Tuscany) with successful results. (Cf. ITALO GIGLIOLI, *Malessere agrario ed alimentare in Italia*, pp. 686-688. Portici, 1903).

for crossing with the South African. A certain number of North-African birds exist in the south of the United States. They are perfectly tame and can be bred in pure strains or crossed with the South African species.

2) The East African Ostrich (*Struthio Massaicus*) seems a link betwen the Ostrich of North and that of South Africa.

3) The South African Ostrich (*Struthio australis*) is the South African variety tamed and selected for the production of feathers. The weight of the eggs varies (as the author has ascertained) from 1300 to 1500 gr. Almost the whole number of those ostriches reared in South Africa, and in North and South America, consists of the South African species.

4) The Somalian ostrich (*Struthio Molydoptanes*) is met with in Somaliland and Central Africa.

Of all the countries constituting the South African Union, Cape Colony possesses the greatest number of ostriches reared in captivity (about 500 000 in 1910).

The breeding is chiefly carried on in the Karroo desert, mainly in the districts of Oudtshoorn, Ladysmith, Graaf-reinet, Klipplaat, Cradock, Grahamstown, etc. A certain amount of rearing also takes place in the Transvaal, Orange Free State and Natal.

The wild South Africain ostrich used once to inhabit the desert of the Karroo; it is still to be met with north of the Orange and Vaal rivers. The ostrich-rearing industry is of comparatively recent date. The first attempts were made in 1850. In 1865 there were as yet only 80 ostriches living in captivity. In 1875 there were 21 000, in 1890, 231 000 and in 1910 about 500 000.

South Africa exported:

In 1898	£	748 565	or	18 901 266.25	francs	worth of feathers
» 1903	»	945 001	»	23 861 275.25	»	» »
» 1906	»	1 412 991	»	35 678 022.75	»	» »
» 1907	»	1 814 220	»	45 809 055.00	»	» »
» 1908	»	1 738 389	»	43 894 322.25	»	» »
» 1909	»	2 098 085	»	52 976 646.25	(95 % of the production of the whole world).	

The chief market for ostrich feathers is Port-Elisabeth. The sale is made by public auction through agents.

The mean annual profit in feathers from one ostrich is estimated at £4 or about 100 francs for the whole of the trade in Cape Colony. However, the best birds are worth as much as 750 fr. or more. The ostriches can produce a good crop of feathers up to a very advanced age (30 and even 50 years). The export of the ostriches and

eggs of the South African Union being strictly forbidden, the trade in ostriches is localised in the South African farms. Young ostriches, of 3 months old and of good breed are sold at from 75 to 200 francs, good adults from 1750 to 2500 francs.

3196 **The Harvest of Silk Cocoons in the South-East of the Russian Empire** (1). (La Récolte des Cocons dans le Sud-Est de l'Empire Russe). — *L'Agriculture Commerciale*, N. 20, p. 563. Paris, 22 octobre 1911.

The harvest of cocoons in the South-East of Russia exceeds that of 1910 by 450 pouds of 36 lbs. In Turkestan the prices are lower than in the Caucasus ; the dry cocoons are rising in price. The lack of organisation of the native silk-growers puts them at the mercy of speculators and renders the culture of the silkworm so little lucrative, that the rural population tends to abandon it for the more remunerative culture of cotton ; consequently the silkworm nurseries have in recent years suffered a progressive reduction.

Russian Empire

3197 EUGÈNE MIR. **Breeding of the Salmonidae**. (Élevage des Salmonidés). — *Journal d'Agriculture Pratique*, 75me ann., No. 40 and 41, pp. 434-436 and 462-463. Paris, 5 and 12 Octobre 1911.

The writer gives an account of the breeding of Salmonidae, such as Trout, Californian or Rainbow-Trout, and American Brook-Trout, as carried on in the department of Aude.

The breeding of these fish requires varied and constant care ; consequently it is only practicable on a small scale. In a corner of the farm troughs of well-pointed brickwork lined with cement are constructed; building them entirely above the ground makes attention and cleaning easier; they are made in couples, each 31 to 39 in. in height and width, and of any length required, with a connecting passage of 39 in. between the two. It is advisable to wall in the troughs to keep out men and animals, also to have a roof to keep off the sun.

France : Aude

The writer finds that, contrary to what is generally stated on the subject, Trout do not require the water to be specially cool or very abundant. Their liking for cool water is due to its holding

(1) Cf. *Bull.* Dec. 1910, p. 321; Abstr. 546, *Bull.* Feb. 1911, and Abstr. 2236, *Bull.* July 1911. (*Ed.*).

more oxygen than warm water; in the same way they prefer rapid streams, for the faster the water runs, and the more broken is its surface, the more oxygen it takes up. Experience has shown that Trout can accustom themselves to water reaching 20° to 22° C. (68° to 72° F.) and having a feeble flow. Rainbow-Trout have been kept in water which for 48 hours had a temperature of 25° C. (77° F.); American Brook-Trout have withstood 24° C. (75° F.); troutlets of 18 months and fry of the year have developed perfectly well in water which reached 20° C. (68° F.) during the summer and was poor in oxygen.

The writer comes to the conclusion that mountainous and hilly districts well supplied with cool streams are not the only ones where Salmonids can be reared; many districts are well suited to the purpose, firstly, because these fish are much less exacting than is generally supposed; secondly, because in many places springs not far below the surface can be found by clever deviners where their presence would not have been suspected.

For aquaria of large size, aeration is indispensable; it can be carried out by means of Koerting's blowpipes constructed on the suction-pump system. Oxygen or ozone may also be prepared fairly cheaply.

Salmonid breeding pays very well, as the price is never below 4 fr. the kilo (1*s* 6*d* the pound) live-weight, while coarser fish, such as Pike, Perch, Tench, fetch only 1 to 2 fr. (4 ½*d* to 9*d*). On a comparatively small area, 30,000 eggs can be incubated; with a loss of 50 %, this would give 15,000 fish of market size in 18 to 24 months. These would weigh 80 to 120 gms. (3 to 4 ozs), and at 5 to 6 fr. the kilo (2*s* 3*d* to 2*s* 8*d* the lb.) would give a gross return of 10,000 fr. (£ 400); deducting 2,000 to 3,000 fr. (£ 80 to 120) for attention and food, the net return is 7,000 to 8,000 fr. (£ 280 to £ 320).

The Fish Trade in Roumania. (Austrian Consular Report). (Der Fischhandel Rumäniens). — *Oesterreichische Fischerei-Zeitung*, Nr. 21, S. 336. Wien, 1 November, 1911. **3198**

The fishing in the Danube within Roumanian limits,is under the monopoly of the State. The fish is sold directly by auction to the small dealers, so as to do away with middlemen on the markets. **Roumania**

The retail dealers may only increase the price paid by 15 centimes the kilo for carriage expenses and 70 centimes for their own benefit.

Russia, France and even Turkey have imported dry and salted fish from Roumania to the amount of 2 247 278 francs.

The new Roumanian industry of preserved foods has almost captured the market, and now only certain special articles are imported.

Roumania produces canned fish in oil and with tomato sauce. The imports of Russian herrings are now falling off owing to the national output of Danube herrings.

Roumania, however, imports from foreign countries preserved fish in the following proportions:

Salt fish:

Germany	value	60 000	Lei (1)
Greece	»	30 000	»
Turkey	»	100 000	»
Smoked fish	»	30 000	»

of which Germany exports the tenth part.

Fish in oil:

France	value	250 000	Lei
Italy	»	200 000	»
Germany	»	50 000	»
Austria-Hungary	»	30 000	»

3199 J. A. RUDDICK. **An Historical and Descriptive Account of the Dairying Industry of Canada.** — *Dep. of Agr.: Dairy and Cold Storage Commissioner's Branch Bulletin*, No. 28, pp. 59. Ottawa, Canada, April 1911.

The leading facts relating to the origin, growth and present development of the dairying industry in Canada are arranged in something like chronological order in this Bulletin. It is interesting Canada to note the aid given by the Provincial and Dominion Governments, in the development of this industry.

Speaking generally the burden of all purely educational work such as dairy schools, instruction at cheese factories and creameries, travelling dairies, etc., has been borne by Provincial Governments. The grants to the Dairymen's Association have for the most part come from the same source. The dairy schools in Canada have been conducted along very practical lines, giving the students as

(1) The *Lëu* is worth 1 fr., *i. e.* 25.25 to the £. (*Ed.*).

much of the scientific side of dairying as they are able to assimilate. The general adoption of the system of factory instruction, after 20 years' trial, is the best proof of the usefulness of that scheme of education. The first Dairy Commissioner of the Dominion was appointed in 1890. This marked the first important step by the Federal Government for direct assistance to the dairy industry. Experimental work was carried on to determine the relat ve value, for cheesemaking purposes, of milks containing different percentages of fat with a view of establishing the payment for milk at the cheese factories by the fat test. The organization and operation of winter creameries to demonstrate the possibility of operating creameries the year round in Canada was begun in the winter of 1891-2. Previous to that time there were no winter creameries in operation in Canada. Two cheese factories were secured by the Government, and with slight improvements to the buildings to fit them for the cold weather and the installation of buttermaking machinery, a start was made, which has since grown to large proportions.

In 1892 the Commissioner was authorized by the Government to start a cooperative cheese factory at New Perth in the Province of Prince Edward Island. The machinery was loaned by the government and was afterwards purchased by the co-operative society. An expert was sent to organize the business and to run the factory as a government dairy station. New factories were organized and the government supervision was continued for several years, and was extended to 11 factories. As a result of this organization and education there were in 1901 in Prince Edward Island 47 cheese and butter factories with an output valued at $ 556,824. Other dairy stations were establised in Nova Scotia and New Brunswick to illustrate the operation of cheese factories and creameries. In 1895 the work of organizing the cold storage services began. The Commissioner was authorized to arrange with the railway companies to run refrigerator cars once a week over stated routes for the purpose of developing the butter trade. Only a few routes were started at first, but the service was extended until cars were run weekly on some 60 different routes from country points to Montreal. Under this arrangement a small shipper with a few packages of butter can have it carried as safely as the shipper who has hundreds of packages in his lot. The government guarantees two-thirds of the earnings of a minimum car load (20,000 lbs.) from starting point to destination and pays $ 4 per car for icing. The creameries were encouraged to erect cold storage rooms by the payment of a bonus of $ 100 to those who provided such equipment. Plans and specifications were furnished free by the Commissioner.

In 1897 the steamship companies were induced to provide refrigerated chambers and the government paid half the cost of installing the machiney on a number of the transatlantic ships. With these improvements the butter trade began to develop and the export trade from Montreal, which was only 32,000 packages during the season of 1894, increased to 539,000 in 1902. The "Cool Air" service on steamships, also subsidized by the government, has been of great benfit to the cheese trade, by eliminating the heated cheese which at one time was a serious menace to it.

The assistance to the creamery industry in the Northwest Territories was begun in 1894 and continued until 1905. The first creameries started in the "Territories" either as private or cooperative ventures failed in the course of a year or two. The Dominion Government came to the rescue, and the Dairy Commissioner was authorized by the Minister of Agriculture to take over the management of the existing creameries, to advance sufficient money to pay off their pressing debts, and to make loans for the equipment of new creameries that would come under the same management.

Confidence was at once restored and under expert supervision the business grew and prospered so that the Department of Agriculture was able at the end of 1905 to give up the active control of a large number of creameries. The new provincial governments are following the policy adopted by the federal authorities and with a modified plan continue to foster the industry.

In 1902, the dairying service undertook to demonstrate the advantages to be derived from the curing of cheese at a proper temperature. It was decided, therefore, to build and equip four large central cool cheese curing rooms, to illustrate in a commercial way the advantages of the proper method of curing. The results were so satisfactory that no cheese factory is now considered up to date unless it is provided with cool curing equipment to prevent the temperature rising higher than 60° F.

The cow-testing movement begun in 1904 has reached large proportions and is still growing. The Dominion Dairying Service assumes the full cost of supervising this work, the keeping of the records, and the testing of the samples. The cargo inspection service at Canadian and British ports, which was inaugurated in 1901, and through which reports are received on the loading and discharge of every shipment of butter and cheese, has enabled the officers of the department to bring about many improvements in the handling and transportation of dairy produce.

The publication of bulletins, giving the results of experimental investigations and other information; a voluminous correspondence

through which inquiries relating to dairying are answered and advice given; and addresses by members of the dairy staff at many meetings throughout the course of a year, are some of the other channels through which assistance is given to the dairy industry.

The Price of Milk in England. — *Mark Lane Express & Agr. Journal*, p. 313; London, September 4, 1911. 3200

The present unremunerative prices of milk continue to receive attention from dairy farmers in all parts of the country, and during the past week many more resolutions in favour of increasing the price in future contracts have been passed. It will be remembered, as reported last week, that the Sussex branches of the National Farmers' Union have given their support to the movement, and as will be seen from a report on another page the Executive Committee of the East Sussex County Branch, on Tuesday agreed that the following be sent out to each member as a final recommendation from the Executive: Great Britain

The Committee recommend that the members should in no case take less than 1*s* per imperial gallon for the seven months from October to April inclusive, and 8*d* per imperial gallon for the five months from May to September inclusive. These prices to range in South Coast towns or their equivalent.

It was also agreed that as these prices were on an average about 2*d* per gallon more than had been paid, that those who send to Creameries should, in making their contracts, have 2*d* per gallon more than previously for the seven months from October to April inclusive, and ½ *d* per gallon advance for the summer five months.

At the adjourned meeting of the delegates of the Central Association of Dairy Farmers, held in London, on Wednesday, at which representatives from all the counties interested in the supply of milk to London were present, it was resolved that the following prices be recommended as those which should be obtained at Michaelmas for twelve months' contracts:

For first class dairies, with fairly even winter and summer quantities, and suitable times of delivery: September 30, 1911, to March 25, 1912, per Imperial gallon, 1*s*.; March 26, 1912, to April 30, 1912, 10*d*.; May 1, 1912 to September 29, 1912, 8*d*.

For other dairies, having long distance transit, indifferent train service, and other adverse conditions: September 30, 1911, to March 25, 1912, per Imperial gallon, 11 ½ *d*.; March 26, 1912, to April 30, 1912, 9 ½ *d*; May 1, 1912, to September 29, 1912, 7 ½ *d*.

Without exception the delegates reported that the grass lands in their respective districts were burnt up, that the hay crops were very seriously deficient, the roots most unpromising, and the straw in the cereal crops very short, and that the prices of cakes, &c., already high, were going up. Scarcity of water in some districts was complained of as a very serious matter.

3201 F. SCHWARZ. **Practical Use of Dr. Ackermann's Apparatus for Detection of Watering of Milk.** (Die praktische Anwendung des von Dr. Ackermann konstruierten Apparatus zum Nachweis von Wasserzusatz zur Milch). — *Schweizerische Milchzeitung*, Nr. 89. 7. November 1911.

Switzerland

The refractometrical examination of milk by Dr. Ackermann's method is generally recognized as valuable for detecting watering; but the necessary apparatus, being too expensive and difficult to manipulate, has hardly been used in dairy practice.

Dr. Ackermann has, however, modified his method by making use of Wieger's researches on the relations between refractometer-indications and the specific gravity of milk-serum treated with calcium chloride.

Wieger's results show that when the specific gravity of the milk-serum is known, the value which would have been obtained by the direct (refractometer) method, can be calculated.

Dr. Ackermann's new apparatus is constructed for the preparation of milk-serum treated with chloride. It consists of a water bath and six glass tubes. In each tube is placed 100 cc. of milk and .83 cc. of calcium chloride solution; the tubes are then dipped into the boiling water of the water-bath for 15 minutes: they are then taken out and cooled.

The serum thus separated is poured into a glass cylinder where its S.G. can be determined by hydrometer. Dr. Ackermann fixes 1.0259 as the normal S.G.; he has prepared a table for reading off the percentage of water added from the S.G. determined. The following is a portion of it:

Specific Gravity	Water added (%)
1.0259	—
1.0246	5
1.0236	10
1.0229	15
1.0216	20
1.0201	30
1.0187	40
1.0176	50

Normal milk may give a serum varying slightly from 1.0259, so that, where possible, other samples should be obtained from a farm sending in milk appearing to be watered; the serum S. G. of these should then be compared.

P. DAIRE. **The Use of Skimmed Milk** (Les utilisations du lait écrémé). — *La défense agricole*, 13e année, N. 41, pp. 472-473. Compiegne, 14 Octobre 1911. **3202**

In the neighbourhood of Houdan " caillebot " is used in feeding chickens. This product is prepared in the following manner: the milk is allowed to curdle spontaneonsly, or by the addition of a little rennet. It is then boiled for some minutes, drained and broken up over a strainer into fragments about the size of a grain of rice, after which it is allowed to cool on a piece of canvas which absorbs what remains of liquid. This food when administered, must have been freshly prepared, as the casein rapidly undergoes considerable chauges which render it injurious. In summer the chickens are fed with it during the first fortnight. In winter it may be given them for three weeks or longer. **France**

For fattening purposes, to every fowl may be given half a liter per day of skimmed milk mixed with well-sifted barley meal, or half barley meal and half maize flour

Mons. Voitellier advises feeding chickens twice and ducks three times a day. The first few days each meal to consist of 12 centilitres of the mixture, increasing to 20 and even 30 or 50 centilitres during the closing days, when dealing with fowls of strong breed. It is estimated that 100 fowls are capable of consuming on an average from 20 to 25 liters per day of skimmed milk. And according to Mons. Voitellier's calculation, the total outlay for one fowl, including flour and labour entailed, barely reaches the sum of 5 centimes or about a halfpenny a day. The complete fattening process requires 20 days and therefore costs no more than one franc; whilst the chicken may sell at 2 or 2 ½ francs, according to the season, with a minimum profit of 1 franc per head.

Mons. Voitellier draws attention to the fact that 40 chickens are as profitable as one calf, if indeed they are not more so. And it would be useful to spread the knowledge of this truth so that the poultry-yard, so long neglected, may become an important source of income to the housekeeper.

3203 G. MAGINI. **On the Comparative Nutritive Value of Buffaloes' Milk and Cows' Milk.** (Sul valore nutritivo del latte di Bufala e del latte di Vacca). — *Atti della R. Accademia dei Lincei; Rendiconti*, Vol. XX, N. 6, pp. 267-273. Roma, 17 Settembre 1911.

From the analysis of ten samples of cows' milk and buffaloes' milk, the following percentage figures were obtained:

Italy

	Cows' Milk	Buffaloes' Milk
Water	86.20 — 86.40	81.25 — 81.58
Fat	3.54 — 3.66	8.20 — 8.28
Albuminoids	3.48 — 3.56	3.65 — 3.90
Lactose	4.80 — 4.90	5.06 — 5.20
Salts	0.70 — 0.80	0.80 — 0.98
Density at 15° C. (59° Fahr.)	1.028 — 1.030	1.033 — 1.0335

These results correspond more or less with König's preceding analyses (average of 793 analyses of cows' milk) and to Rimini's (analyses of buffaloes' milk).

Buffaloes' milk, with less water content, has one third more fat and also more albuminoids and lactose; it is therefore far superior to cows' milk, from the nutritive point of view. It is, however not quite so digestible if taken pure, though it has a pleasant taste; its products, butter, cheese, "ricotta", etc. are excellent, and easily digested.

3204 **Bitches' Milk.** (Le Lait de Chienne). — *Le Petit Chasseur et le Cultivateur Français*, N. 40, p. 12. Paris, 8 Octobre 1911.

As a supplement to the information contained in the above, the following observations are important.

France

Average composition of Bitches Milk	‰
Water	791.7
Solids	208.3
Casein	49.6
Albumin	37.3
Fatty matters	85.5
Lactose	27.1
Salts	3.0

Bitches' milk is very different from that of other animals.

The milk of domestic animals, cow, mule, donkey, sow, goat, sheep, and rabbit, differ much from one another, with the exception of goats and cows' milk, which are almost alike.

	Cow's Milk	Goats' Milk
Sp. Gravity. .	1.032	1.030
Water	860	866
Solid Matter .	140	138

Bitches' milk is very rich; it increases in quality until the animal is six years old, when it becomes poorer.

G. BAGNALL. **Cream Cheese.** — Bulletin No. 30, *Dairy and Cold Storage Commissioner's Branch, Department of Agriculture,* Ottawa, Canada, 1911, p. 7. **3205**

The process of manufacturing cream cheese is inexpensive and simple and is especially adapted for making cheese for home use. The demand for this cheese has greatly increased of late.

The temperature of the room in which the cheese is made should range from 60° to 65° F. Cream containing 15 % of butter fat is sufficiently rich.

For the making of ten cheeses there would be required one gallon of cream, one tablespoonful of fresh buttermilk or clean sour skim-milk as a starter, and twenty drops of rennet extract, or equivalent in tablets. **Canada**

The process is as follows:

1) Put cream and starter in a clean vessel and mix.

2) Get the temperature between 80° and 84° F.

3) Add the rennet extract, diluted in five times its bulk of water, to the cream, stirring gently and thoroughly for two minutes.

4) Cover with a cloth to retain the heat and let it stand for two or three hours, or until a nice soft curd is formed.

5) Spread a draining cloth (either huckaback or fine linen towel about 30 inches square) in a bowl, then with a skimmer gently ladle the curd into it, being careful to take thin slices, and to break it as little as possible.

6) Gather up the cloth and tie it with a string, without crushing the curd, then hang it up to drain, the bowl placed underneath to catch the whey. Let it drain from 12 to 24 hours.

7) When sufficiently drained, turn the curd into a clean cloth, sprinkle with salt to taste, and knead in the cloth to thoroughly mix the salt.

8) Fold the cloth neatly over the cheese, and place between the boards to press with a brick on top, and leave for a few hours or until the cheese is of the consistency of newly churned butter.

9) Cover the lid of the mould (a cream cheese mould can be obtained for fifty cents) with a piece of muslin and place another piece of muslin (6 inches square) in the mould. Put in four ounces of the cheese. Put the lid on the mould and press. Fold the ends of the muslin over the cheese and press again, when the cheese may be taken from the mould and wrapped in parchment butter paper.

Weight of each cheese: 4 ounces; retail price 15 cents.

The Bulletin contains illustrations of the different stages of the process.

3206 **The Preparation of "Fontina" Cheese.** (La preparazione del Fontina). — *Gazzetta agricola:* Anno XXIV, No. 41, p. 166. Milano: 7 Ottobre, 1911.

"Fontina" is a fat cheese, of yellowish white colour, soft, and of a sweet and delicate taste; it is usually sold in round shapes of 10 to 20 kg. (22 to 44 lbs).

Formerly it was prepared only in the *malghe* (summer mountain **Italy** pastures) of the Val d'Aosta, while the cattle were there. The milk used was unskimmed, and the rich, sweet grass made it a very choice product.

To-day "Fontina" is prepared during the cold season in all the village dairies of the Val d'Aosta, and also in many parts of the province of Turin. In the summer it is made in the Alpine chalets, and this industry continues to extend, while the Val d'Aosta remains its centre.

It is made as follows:

The unskimmed milk is curdled for half an hour at a temperature of 35°-38° C. (95°-100.4° Fahr.) The curd is first broken by a spatula, and then broken up into tiny fragments with a breaker (*spino*). (1) Then the mass is heated up to 45°-48° C. (113°-188.4°

(1) The *spino* consists of a wooden axle with cross-pieces, which are arranged in such a way that any two consecutive cross-pieces are perpendicular to each other. This simple apparatus completely breaks up the curd and is used to keep it stirred up. (*Ed.*).

Fahr.) for about half an hour, and after three quarters of an hour of continuons mixing, it is placed in wooden shapes and subjected to moderate pressure. Then follows the process of salting; this as well as the methods adopted for keeping it, are the same as for Gruyère. After maturing for two or three months, the " Fontina " is ready. If the cheese has turned out well, it ought to be homogeneous, marked with a few oblong eyes and it should have developed its characteristic odour. If it is kept for six months, it becomes firmer, with deeper colour and piquant taste.

There is a large consumption of " fontina ", especially in the winter, and it is sold in large quantities at Nice and Marseilles and other important centres.

CHOREN ERIZIAN. **Cheese Production in the Caucasus.** (Die Milch und ihre Erzeugnisse im Kaukasus). — *Milch Zeitung*, No. 40, pp. 395-398. Leipzig, 7 Okt., 1911. **8207**

There are two types of cheese in the Caucasus, local and foreign, such as Emmenthal and Dutch cheeses.

Rennet is mostly used, otherwise sour milk. There are also different kinds of cheese, according as it is made of ewe's milk, of goat's milk, or of cow's milk; and lastly, there are hard and soft cheeses. **Caucasus**

Among the hard reunet cheeses, the following may be mentioned according to the localities and the modes of manufacture:

Turchini, Cosachi or *Sidrilini, Daralagös*, made by the Persian Armenians, *Lesghiui Mothalsanie*, which is folded in sheepskin, *Tschil* or *Tscheischilpaint* and *Thelpanit.*

Among the soft-grained cheeses the best are:

Sulguni, Circassian and *Tschiklinti Kivelt.*

The best of the sour milk cheeses are;

Armavit, Adsehari, Tscheschenisch, Kald, Nagaisch and *Remtschik.*

Thare, Tschorathan and *Schor* are made with butter milk.

Dulama and *Chischu* are made with colostrum and are gelatinous products.

With cream different kinds of *Kaimakh* are made, *i. e.*, a sort of cream obtained by mixing boiled milk with butter and honey. Also the alcoholic drinks *Kefyr* and *Kumys* are made from milk.

The *Mazun* common among the Armenians is unlike ordinary cream owing to the addition of odorous substances and its greater consistency.

3208 LOUDON M. DOUGLAS. **The Meat Industry in its Relation to Agriculture in the United Kingdom.** — *The Journal of the Royal Agricultural Society of England*, Vol. 71, pp. 145-146. London, 1910.

By-Products. — That scientific education in the meat industry of the United Kingdom is neceseary may be inferred if we consider for a moment what is happening in foreign contries. In Chicago, Argentina, and Australasia, packing houses exist where cattle, sheep, and pigs are handled in vast quantities, and where it is possible to handle vast quantities of by-products. These are utilised in every possible way, so as to produce specific articles which are largely used in the arts and manufactures. In an ordinary packing house there are about a hundred different products made from a slaughtered bullock, and thus the scientific method of handling the animal results in a very much increased gross value. In the United Kingdom no such scientific pratice exists, and the by-products which are utilised here are few in number, They consist, for the most part, of the blood, hide, hoof, and spur, the in testines, lungs, heart, stomach, and liver. No attempt is made in this country to produce the finer products such as oleo, glue, gelatine, pharmaceutical preparations, and fertilisers, which bulk so largely in the properly designed modern packing house. This points to the fact that we are much handicapped in this country when competing with foreign nations, and it is therefore evident that, if the home meat industry is to be conducted at a profit in the future, in the face of such enormous competition as has been indicated, it will be necessary to concentrate the handling and slaughtering of animals to a greater extent at various centres, so that the residual products may be handled to advantage. Such a view might commend itself to modern farmers and also to small-holders, and might be capable of giving rise to some national scheme which would permanently benefit agriculture.

United Kingdom

3209 **The Production of Wool for 1910-1911 in Australia.** (La Campagne lainière en 1910-1911 en Australie). — *Questions Diplomatiques et Coloniales*, No. 352, p. 507. Paris, 16 Octobre 1911.

During the twelve months of the season 1910-11 the production of wool in Australia for exportation was 4,468,650 bales: at a medium price of £. 12. 10s 4*d* per bale: the total production amounts to £. 30,900,520. Australia and New Zealand have used in local manufactures 55,000 bales, of an approximate value of £. 688,417. The total value of wool for 1910-11 was £. 31,588,937. against £. 33,808,912 for 1909-10.

Australia

Wool Season of 1910-11 in Argentina. — *The Pan American Union*, pp. 630-631. Washington, September 1911. **3210**

The Argentine wool season for 1910-11 was closed on May 20, 1911, after a most encouraging and profitable season. Despite a somewhat pessimistic prospect early in the season, the statistics just furnished by the Central Produce Exchange indicate a greater quantity of shipments than the previous season. **Argentina**

		1910-11	1909-10
Total Receipts	kilos	88 286 034	79 275 113
Shipment	»	87 657 193	78 386 344
Stock on hand	»	628 841	888 769

BEN DANON. **Sheep-and Goatskins of Oran (Algeria) and Morocco.** (Peaux de Moutons et de Chèvres Orano-Marocains). — *Supplément au No.* 21 *du Bulletin de l'Office du Gouvernement Général de l'Algérie*, pp, 391-406. Paris, Année 1911. **3211**

Algeria not only exports live sheep and goats, but also their wool and skins.

Goat raising in Algeria is on a very large scale, and though but few live goats are exported there is a most important trade in their skins, which are mostly sent to America.

As regards their industrial worth, these Algerian sheep- and goatskins are highly appreciated abroad. And if only the most elementary methods for preserving them till the day of sale were adopted, an extra 30 to 40 per cent. might easily be gained. **Algeria. Morocco**

The skins are classified according to:

a) The species, (sheep, goats) ;
b) The sex, (she-goat, he-goat) ;
c) Age, (kids, male and female).

The skins are either shorn or unshorn. Thus there are four classes :

(1) Unshorn skins . . . . . } of sheep.
(2) Shorn » . . . . . }
(3) Hairy skins (winter) . . . . } of goats.
(4) Shorn » (summer) . . . . }

There are besides two classes of skins: those furnished by the butcher and those obtained from animals that have died from disease etc.

Thus : 1) Butcher's skins (of animals that are bled ; and
2) skins of animals (not bled, or only bled *in extremis*).

The " washed skins " are the dirty skins which have been washed. This class is of no importance.

Both as regards the price and the yield, the skins are divided into the following three classes, arranged in descending order of value:

Butcher s skins,
Washed skins,
Skins of animals died from disease.

The value of a skin depends on its thickness and weight (goat). The fine skins are supplied by the sheep. If the skin be not fresh, much importance is attached to its dryness. The thickness of a sheepskin is estimated by folding a bit over in the region of the belly, or a little in front of the udder, or near the sheath. The fineness of quality depends on the amount of hair or wool on the skin.

The shorn skins of summer are preferred to the unshorn skins of winter. The thickness of a skin varies inversely as the fleece covering it. A goatskin is always proportionally thicker than a sheepskin. Animals that are housed or accustomed to shelters have inferior skins to those kept in the open air.

The following conditions are required for the skin :

a) the greatest possible uniformity of surface;
b) neither folds, creases, nor ridges of any kind;
c) a uniform desiccation, without any moist spots;
d) no remnants of flesh;
e) the surface must appear to be dry, not moist, fatty, or oily ;
f) a good skin must be as nearly entire as possible.

The sheepskins are put on the market fresh from the butcher's, and are called " fresh butcher's skins ".

This industry is liable to fraudulent attempts to make the skins of diseased animals pass for " butcher's skins ", and to increase the weight.

The best way of skinning is to tear the connecting tissue, not with a knife, but simply with the hand, as the Arabs do. This is easier to do if the animal has been inflated. This inflation must not be done with the mouth, but with an instrument made on purpose.

The dealers in the various centres acquire their stock of skins piece by piece, and with considerable trouble.

The skins are classed according to their quality ; skins damaged in any way, or injured by cutting, as well as the remnants form a class by themselves.

The lamb skins, which are stretched on sticks shaped like a U, and dried, are kept separate.

The desiccation should be carried out in the shade, so that it may be uniform and slow. The skins must be stored in a dry place, and there should be a space of 10 to 15 cms. (4 to 6 inches) between the floor and the first layer. The floor should be covered with lime or fine sand. In the summer the wool is liable to be attacked by mites, and the skin by mould.

Agricultural Industries.

Wine Trade and Consumption in the Netherlands. — *Bulletin de l'Office du Gouvernement Général de l'Algérie*, N. 20, pp. 311-313. — Paris, 15 Octobre 1911. **8212**

The importation of wine in the Netherlands has risen from 64 995 tons in 1900 to 92 742 tons in 1910, of which 70 996 tons were in casks, and 21 746 tons in bottles. **Netherlands**

The foilowing table gives the amount of wine in casks brought into Rotterdam in 1909.

From France	hectolitres (1)	42 225
» Spain.	»	16 443
» Belgium	»	7 840
» England	»	1 048
» Germany	»	6 234
» Hamburg	»	3 365

In 1909 Amsterdam imported 28 958 tons of wine in casks.

The wine trade in the Netherlands is not so much for local consumption at for distribution in vaious centres. In this respect Rotterdam threatens to become a rival of Hamburg. There are no wine shops in the country; the « posadas » or « bodegas » are numerous, and they sell all kinds of beverages, and especially beer.

During the last 10 years the consumption of wine in casks has remained stationary. In 1900 the amount was 114 064 hectolitres, in 1910 it was 112 654 hectolitres.

Of French wines the red, and specially the Bordeaux are preferred. Of white wines those of the Rhine are most appreciated.

The Spanish wines have supplanted those of Vaucluse.

(1) 1 Hectolitre = 22.0096 gallons.

The former have more colour and are less expensive, and are therefore more used for blending.

There is a certain demand for Algerian wines because of their cheapness; they are bought both for ordinary consumption and for blending.

The Californion wine industry is making great efforts to push its products on the Dutch markets.

The annual consumption of Italian wines in casks, specially from Barletta, varies from 1 200 to 1 500 hectolitres; while of Portuguese wines the amount is about 4 500 hectolitres, and of Turkish wines about 2 000 hectolitres.

3213 **The Wine and Oil Production of Turkey.** — *Journal of the Royal Society of Arts*, No. 3072, p. 1062. London, Oct. 6, 1911.

The production of wine is a growing industry in the Ottoman Empire, especially in Syria, Palestine and the Smyrna and Salonica district. It is estimated that in 1910 the output aggregated some
Turkey 100,000 tons, most of which was consumed in Turkey and Egypt. Germany, France and America, however, buy increasing quantities of Turkish wines, both red and white. Wine constitutes the principal item of export to the United States from Jerusalem.

It is estimated that out of a production of 60,000 tons of olive oil, which is a fair average estimate for Smyrna and the adjoining islands, 15,000 tons are exported, another 15,000 tons absorbed by the Turkish soap industry, and the remainder consumed by the inhabitants, who, in consequence of the increased cost of olive oil, are gradually forced to adopt substitutes from abroad. The total output of oil in the Ottoman Empire amounts to about 75,000 tons. There is a tendency in Turkey now to produce higher grade oil, fit for European and American tables, and this is particularly noticeable in Aivali, Mitylene and Crete.

3214 R. Haid. **Advantage of pure Yeast in the Fermentation of strongly Sulphured Must.** — Allgem. Wein-Zeit., 1911, No. 27. Chem. Zentr. 1911; 2,711-212 Abs. *Journal of the Society of Chemical Industry*, Vol. XXX, No. 18, p. 1133. London, 30 September, 1911.

Culture yeasts are more resistant to sulphurous acid than wild
Germany yeasts, and can hence be used for the fermentation of strongly sulphured musts. Whilst in the case of must allowed to ferment spontaneously, fermentation was prevented by 150 mgms. of sulphurous

acid (in the form of sodium bisulphite) per litre, quantities of 200 mgms. or more (according to the race of yeast used) of sulphurous acid per litre only retarded fermentation, when the must was sown with 1 per cent of pure yeast; and when fermentation once started it proceeded regularly and with the normal velocity.

BLIN. **Grape Must.** (Moût de Raisin—*Raisiné*). — *L'agriculture commerciale*, No. 20, pp. 569-570. 22 Oct. 1911. **3215**

The importance of fresh grape juice increases each year, on account of its being increasingly recommended by the medical profession.

England has, for some years, been an excellent customer.

Another grape product, which is important because it keeps so well, is *raisiné*, or a preserve made of grapes. **France**

Burgundy is justly celebrated for its *raisiné* which is used in the confectionery trade.

The manufacture of this product would be an appreciable source of revenue in other districts, and would introduce a commercial element in wine-growing.

The method of preparing *raisinés* in Aude in as follows.

The grapes are stripped from the bunch and pressed by hand, the juice is collected, and placed in a vessel over the fire and the scum removed as it forms. In order to neutralise the acidity of the juice, a little powdered chalk is added (about 50 gr. per 10 litres of juice) until effervescence ceases. The scum is taken off, and the vessel removed from the fire.

After an interval of twelve hours, the liquid is decanted, and two kinds of preserve can be made with it: pure *raisiné*, and a preserve, properly so called, of which this substance is an ingredient.

Pure *raisiné* is obtained by the concentration of the grape-juice, while the concentrated juice serves as the base of the preserve.

While the neutralized juice settles, some other fruits are each cut into four pieces and are boiled separately in a vessel containing a relatively small amount of this liquid.

The object of this treatment is to obtain firm slices, which do not become reduced to pulp in the subsequent boiling.

The must in which the fruit was first boiled is thrown away, while that which has not been used is concentrated over a slow fire and, when the process is nearly complete, it is added to the fruit slices and the whole is heated for 30 to 40 minutes.

A small amount of the liquid dropped upon a plate, serves as a test as to whether the process is complete, and the concentration sufficient to give a preserve of a normal consistency.

3216 SADERCE. **On the Scalding Process of Steffen Modified by Wogelberg.** — *Bulletin de l'Association des Chimistes de Sucrerie et de Distil'erie de France et des Colonies.* Tome XXIX No. 4 pp. 216-218. Paris, Oct. 1911.

The writer considers the advantages and disadvantages of the new process of scalding with reabsorbtion of the molasses, as pro-
France posed by Wogelberg in modification of Steffen's process.

In this proccss only white sugar and beet slices, with some sugar content, are produced. The fresh slices are scalded and then subjected to three pressures, The first serves chiefly to expel the raw juice, while the other two, and the first to a certain extent, serve to introduce into the slices the impurities of the molasses.

In this way there should remain in the slices from 2.5 to 3 % of sugar, which is not appreciably superior to the percentage of loss under the usual processes of diffusion. That is to say, until sugar is double the value of the slices (which contain some sugar) this process would give the maximum yield for the beets worked.

But the writer observes that it is impossible to make a complete diffusion in three vessels without a deterioration of the different substances present. It is for this reason that loss of sugar often occurs in the process of scalding the slices, with reabsorption of the molasses, and this loss may be as much as 3.5 to 4.5 %.

He observes also that the juices obtained in this way are always less pure than the juices of diffusion. This point should not be overlooked by the manufacturers who produce sugar directly for consumption. Moreover when beets which have been cultivated in clayey soils are treated with the scalding processes the juices obtained are always difficult to treat, and further loss of sugar occurs in the scums.

Lastly, if a larger amount of liquid were obtained by the process in question than by Steffan's original process, the cost of evaporation would be increased.

Like in all other processes of scalding, a desiccation plant is also required for this one, and the advantage of it depends on the price of the slices. And as the slices containing sugar are little sold in the neighbourhood of the factory, the production of fertilising substances is reduced in the centre under consideration — a thing which reflects on the production of the raw material used by the factory, especially when the factory is situated in a district where cultivation is subdivided; because in such places, stable manure is much more employed than artificial fertilisers.

To sum up. By the new process, *i. e.*, scalding with reabsorption of the molasses by the slices, less sugar is produced per 100 kgs. of treated beet, and there is no molasses.

On the other hand, the sugar which is obtained in lesser quantity as pure, or as molasses, is found in the desiccated slices, which contain moreover a little more dry matter.

J. Apsit and Brocq-Rousseau. **On the Valuation of the Quality of Gluten** (Sur l'appréciation de la qualitè du Gluten). — *Annales de la Science Agronomique Française et Etrangère.* 28e Année, No. 2, pp. 81-86 + figs. 2. Nancy, Août, 1911. **3217**

The writers call attention to the great importance of exactly valueing the quality of gluten. The quality, depends, as is well known, on its elasticity, on its extensibility, and on its dilatation. **France**
The only existing apparatus for estimating the quality of gluten is Boland's aleurometre, which measures the dilatation produced in a mass of gluten, when heated to 150-200° C. (302-392 Fahr.).

Considering the defects aud inexact results obtained from this apparatus, Messrs. Apsit and Brocq-Rousseau have constructed another, which is intended to indicate certain changes in the physical state of the gluten which are not shown by the method now in use.

The apparatus is made to indicate, by graphs, the elongation, up to the breaking point, of a mass of gluten of a given shape, under a constant weight.

The curves traced indicate::

1) The elongation of the gluten until it breaks;
2) The time required for the above elongation;
3) The weight which has caused the elongation and the breaking.

It appears that the writers have shown, by means of their apparatus, that the quality of grain gluten is changed, if heated for 20 minutes at 100° C. (212° Fahr.); for an hour at 90° C. (194° Fahr.); for three hours at 80° C. (176° Fahr.); and for 20 hours at 75° C. (167° Fahr.).

The name they have given to the apparatus is " ectasiograph, ,, from the Grech *ectasis,* elongation.

3218 L. VUAFLART. **Nitrogen and Phosphoric Acid in Wheat and in Flour.** (Azote et acide phosphorique dans le blé et dans la farine). — *Journal d'Agriculture pratique*, 75e année, T. II, N. 39. Paris, 20 Septembre 1911.

France

By a wet method, without previous incineration, it has been proved that the phosphoric acid content of wheat is greater and less variable than might have been supposed from the figures quoted in certain works.

From the analyses thus made of about 50 samples of soft wheat of the years 1908, 1909 and 1910, and also of the flours of 10 % extraction made from it, it was found that the percentages given by the wheat were 0.8 and 0.9, and by the flour 0.21 to 0.24.

The hard wheats and the flour derived from them are often richer in phosphoric acid.

If the average content in nitrogen and phosphoric acid of the wheat of the three years, is compared, taking that of the wheat of 1908 as 100, we get the following figures:

	Nitrogen	Phosphoric acid
Wheat of 1908	100	100
» » 1909	115	100.6
» » 1910	116	100.9

Thus the nitrogen content rises from 100 to 116, but the amount of phosphoric acid remains practically the same.

The examination of flour made from the different wheats gives similar results:

	Nitrogen	Phosphoric acid
Flour of 1908	100	100
» » 1909	112	105
» » 1910	115	102

In the case of the flour as in that of the wheat, the amount of phosphoric acid appears less variable than that of nitrogen.

Allowing the existence of a close connection between the two substances, is it permissible to deduce from the relative constancy of the phosphoric acid that an increased application of phosphatic fertiliser would considerably augment the gluten content of the flour, and give rise to still richer flours than those of 1909 and 1910?

Can it be hoped that by increasing the amount of phosphorus, soft wheats can be rendered more similar to hard wheats (which

contain in proportion more phosphoric acid than nitrogen) and their bread making qualities thus improved?

These two questions still remain to be answered.

In any case, the figures quoted above show that meteorological conditions have much more influence upon the assimilation of nitrogen than upon that of phosprhoic acid.

Louis Wuyts and F. Courtoy. **Manufacture of Margarine from Cocoanut Oil.** (De l'huile de Coprah à la margarine de Coco). *Annales de Gembloux*, 21me An. Bruxelles, 1 Octobre 1911. **8219**

The world's production of edible cocoanut oil increased from 10 million kilos (nearly 10 000 tons) in 1902 to 70 million in 1910.

The commercial success obtained by the pioneers of this manufacture is partly due to a tendency to increase the use of margarines, prepared almost exclusively from cocoanut butter, to help out natural butter.

In this there is nothing illogical, for of recent years the price of natural butter has been too great for many purchasers; so it is natural that a product having the same taste, properties, and digeative value, but selling at half the price, should be preferred. **Belgium**

The fat utilised for vegetable butters comes almost exclusively from cotton-seed, palm-seed and cocoanut oils, the last being most used.

The greater part of the cocoanut products is prepared in European oil-factories. As the nut is very subject to fermentation, it is treated in certain ways to keep it sound during transport. The nut is cut into pieces and heated in the sun or in higly perfected hot air apparatus; the dried pieces thus obtained, known as *copra*, are destined for the European markets. The oil is extracted by pressure; the product is called copra-oil. This is not so good as the oil obtained from fresh cocoanuts.

The writer further describes the processes to which the copra-oil is submitted to obtain the fat, or cocoanut butter; this is either consumed as it is, or used in the manufacture of vegetable margarine, frequently also for the adulteration of cows' butter.

3220 **Sweden's First Cold Storage Company.** (Sveriges första kylmagasinbolag). — *Nordisk Mejeri-Tidning*, No. 39, pp. 460-461. Stockholm, 29 Sept. 1911.

The first Cold storage Company in Sweden has been established at Kristianstad, and it has taken over the depot and ice-house already existing there.

This Company purposes, not only supplying Kristianstad and its neighbourhood with every facility for cold-storage; but hopes to extend this advantage throughout the country.

Sweden

The chief aims of the Company are to preserve the large supply of fruit which has hitherto been wasted or destroyed, to enable native fish (especially herrings) to be stored at the season when it is plentiful and to steady the market prices of perishable goods.

It is to be hoped that this new scheme will meet with success.

It is the work of Swedish thought; Swedish apparatus is employed, and, as a rule, Swedish ice is used.

The Company will send the goods by rail in its own refrigeration cars, *look after the farmer itself*, and undertake that depots shall be made at all necessary places.

Attempts to introduce this arrangement into Sweden have hitherto failed, owing to the disinclination on the part of the Railway Boards of management to allow any cars but their own upon their lines.

3221 LEON RONNET. **Characterization of Artificial Colouring Matter whose Use is permitted in France for Colouring certain Foods.** (Caractérisation des Colorants artificiels dont l'Emploi est autorisé en France pour la Coloration de certains Produits alimentaires). — *Annales des Falsifications*, IV^me. An., N. 35, pp. 474-476. Paris, Septembre 1911.

In a series of articles on the colouring of foods, and in particular in the fourth one, in No. 32 of *Annales des Falsifications*, M. F-

France

Muttelet gives the analytical characters of the 21 colouring matters allowed in France by the order of July 4th, 1910. M. Ronnet completes this by a table showing the methods for determining rapidly the class of colouring-matter used.

The following is the table:

To an aqueons solution of the colouring-matter add 10 % *caustic potash solution, then shake up with ether, and after allowing to settle, decant off the ether:*

I. The ether is coloured, or becomes so when shaken up with a 5 % acetic acid solution:

Basic Colours.

(*a*) Colour yellow (Amino derivative of diphenylmethane) . *Auramine.*
(*b*) green . . . . *Malachite Green* } (amino-derivatives of rosaniline)
(*c*) violet . . . . *Paris violet* }
[I *a-c* are not reducible by stannous chloride in hydrochloric acid].

II. The ether is colourless and gives no coloration with 5 % acetic acid:

Acid Colours.

Acidulate the aqueous solution with acetic acid and shake up with ether:
A. The ether is coloured, or becomes so on shaking with 20 % ammonia:

Non-Sulphonated Acid Colours.

(*a*) pink (phthaleins) . . . . . *Eosin, Erythrosin, Bengal Pink.*
[II *A* (*a*) is not reducible by stannous chloride in hydrochloric acid].

B. The ether is colourless, even after shaking with 20 % ammonia:

Sulphonated Acid Colours.

(1) Azo-dyes.
(*a*) red . . . . . *Bordeaux B, Crystal Ponceaux, Bordeaux S, New Coccin, Solid Red, Ponceau RR, Scarlet R.*
(*b*) orange . . . . . *Orange I.*
(*c*) yellow . . . . . *Chrysoïn.*

(2) Nitro-phenol
(*a*) yellow . . . . . *Naphthol Yellow.*

[II *B* (1) and (2) are reducible by stannous chloride in hydrochloric acid; not re-oxidizable; contain no amino-group].

(3) Derivatives of rosaniline:
(*a*) red . . . . . *Acid Fuchsine*
(*b*) green . . . . . *Acid Green J.*
(*c*) blue . . . . . *Water Blue 6* B, *Patent Blue.*
(*d*) violet . . . . . *Acid Violet 6* B.

[II *B* (3) are not reducible by stannous chloride in hydrochloric acid.].

Agricultural Engineering and Farm Machinery and Implements.

3222 A. MAGNIN. **A System of Unloading Sugar-Beets.** (Système de déchargement des Betteraves). — *La Sucrerie Indigène et Coloniale*, LXXVIII, No. 16, pp. 361-363+figs. 5. Paris, 17 Octobre 1911.

This invention, which forms the subject of patents Nos. 428-446, is an improved system of unloading beets by means of a moving band and a special net.

France It is well known that attempts have always been made to reduce the labour involved in unloading beets from carts and waggons at the sugar-factories and beet-distilleries. The unloading of the beets into heaps or into silos is generally done by hand at the factory, as is the unloading of carts into the trucks at the railway-stations.

To reduce labour, mechanical and hydraulic tilting apparatus has been invented; lastly pliable frames with metal laths, or steel or hemp netting, or strips of canvas crossing one another, have been arranged to fit against the sides and bottom of the carts. These frames are lifted on one side by tackling, and turn out the roots on the opposite side.

Mechanical and hydraulic tilters involve a considerable outlay; the wear and tear, interest on capital, men required to work them, mount up to as much as, if not more than, the expenses of unloading by hand.

The system of frameworks, whether of metal laths, crossed strips of canvas. or steel or hemp rope, has given better results; but their rapid wearing, and the special arrangements required, have shown many disadvantages.

The system of unloading for which the present invention is adapted does away with these disadvantages; it consists in a special arrangement of the network-frame to hold the load of roots and the use of a crane, fixed or movable, operating the frame for unloading.

The invention comprises:

1) A group of apparatus comprising a movable or fixed crane, carrying one or two windlasses fixed on trolleys, and allowing the unloading of the roots by means of a frame placed in the carts.

2) A special arrangement of the crane with lifting clasps and inclined planes.

3) A special form of frame, made of ropes and cables, forming a network without any sharp points or projecting knots, at once simple and strong.

The Meyenburg Motor Culture System. (Der Motorkulturwagen, System Meyenburg). — *Landwirtschaftliche Maschinen und Geräte*; N. 20, Jahrgang 1911. Artern, Sachsen. 3223

Mr. K. von Meyenburg, an engineer of Basel, has constructed a motor which, when in connection with a revolving cylinder, serves as a machine for cultivating the ground,

Alone, it can by used for traction work, or as a source of energy for stationary machines. Switzerland

The apparatus when employed for the first mentioned purpose acts as follows:

The cylinder is attached behind the motor and when set in motion it plonghs up the soil by means of the elastic teeth made of round steel wire with which it is provided. The cylinder has no articulation, and its teeth are not only very durable but are easily replaced at a small cost.

The width of soil turned up is 2,2 m. while the depth can be regulated by simple perpendicular supports.

Trials of the machine have been made on the estate of Mezohegyes in Hungary.

PRICE-CAMPBELL. **Cotton Picker Demonstration.** — *Farm and Ranch.* Dallas, (Texas), September 23, 1911. 3224

A demonstration of the Price-Campbell Cotton Picker was held seven miles east of Dallas (Texas) in a field which was an average this year for the North Texas Black Land Belt. Two machines were set to work, picking nearly 5 pounds of cotton a minute each. United States: Texas

The cotton was compared to some that had been previously picked by hand, and the machine-picked cotton made a better showing.

The machine is equipped with a cleaner which removes the dirt and much of the trash, leaving the locks disconnected, so the staple will not be injured by the gin saws.

Upon a close examination of the rows it was found that rows picked by the machine compared very favorably with hand-picked rows, a very small per cent of locks being left.

It is estimated that one machine with a man to operate it and a boy to take care of the cotton after it is picked, can pick about one acre every hour, or at least eight acres a day. It seems that the perplexing question of picking cotton by machine has at last been accomplished.

3225 C. A. Ocock and F. M. White. **Concrete Silo Costruction.** — *The University of Wisconsin Agricultural Experiment Station*, Bull. No. 214 pp. 31 + fgs. 18. Madison, Wisc., July, 1911.

Considering the scarcity of lumber and its high price, the writers recognize that reinforced concrete silos are equal, if not superior, to other types. And the features of concrete silos are stated as follows.

United States

A good silo should be round; air-tight; with a smooth-surfaced interior, provided with rigid walls which should be non-conductors of heat and cold, and of sufficient strength to resist strong winds. A well constructed concrete silo satisfies all these and many other requirements. Such a structure as a monolithic silo is reinforced throughout; the floors, posts, beams, and girders are practically tied to the walls by a network of steel. The size of the silo varies according to the number of animals in the herd. It should be large enough to feed out 1 ½ to 2 inches (38-50mm) of silage each day. A silo of 38 tons (m. t. 38.6) capacity will furnish succulent food for 14 cows for 180 days.

The forms used in building solid wall silos vary in width from 2 ½ to 4 feet (m. 0.760 to 1.216). Two forms are always necessary, an inside and an outside, spaced about 6 inches (150 mm) apart. By use of two forms, 5 to 6 feet (m. 1.515 to 1.818) of wall can be constructed daily. Concrete silos should be well reinforced to prevent cracking. On account of the rougher surface secured by twisting wires together, and forming a continuous cable, such cables are supplanting the smooth steel rods for reinforcement. The reinforcement should be laid about 1 inch (25 mm) from the outside of the wall and must be continuons. For vertical reinforcement the ⅜ inch (9.5 mm) steel rods are preferable and should be placed from 1 ½ to 2 inches (38 to 50 mm) from the ontside of the wall. A well constructed concrete block silo is very desirable where sufficient cement of a proper mixture and adequate reinforcement is used. Hollow two piece blockis are most economical and should be considered as the most desirable for concrete block silos. They should be laid in a good bed of cement and reinforced with ⅜ inch (9.5 mm.)

rods placed between every layer of blocks for the first 15 feet (4.56 m.) above the ground and between every other layer above this height.

The silo should be located on the south side of the barn or sheltered by other buildings. Doors, ventilators and windows of all silos should be closed during frost except at feeding time A wash of cement and water about as thick as cream should be applied with a stiff brush as a preservative to the interior of plastered or concrete silos. Coal tar, asphalt, or creosote should never be used as a preservative on a concrete silo.

A concrete silo 14 feet (4.256 m.) in diameter, 35 feet (10.64 m.) high, with a capacity of 95 tons (m. t. 96.42) will cost approximately $ 300 (1545 fr. . Home-made forms, as described in this bulletin, cost from $ 40 to $ 70 (206 fr. to 360 fr), whi e the commercial form will cost from $ 100 to $ 450 (515 fr to 2317 fr). Variations in the price of material and labour will correspondingly reduce or increase these expenses.

PLANT DISEASES

NOXIOUS INSECTS AND OTHER PESTS.

INTELLIGENCE

Non Parasitic Diseases of Plants and their Control.

CH. GROSDEMANGE. **Effects of the Summer of 1911 on Horticultural Products in France.** (Les effets de l'été 1911 sur les cultures horticoles en France). — *Revue horticole*, 83me année, No. 20, pp. 468-471. Paris, 16 Octobre, 1911. 3226

The intense heat felt in France during the whole course of the summer of 1911, was such as to cause serious failure in all horticultural work.

The Author has thought it worth while to record, in this article, the effects of the heat and drought on the plants in the garden of the Horticultural Society's Training-School at Soissons, where the soil is sandy and easily watered, for the most part by means of the pump and hose. France

Among the various plants examined by the Author, the following must be noted: bulbous Begonias with large single and double flowers, which were completely killed; Dahlias whose flowering was an utter failure; Chrysanthemums grown in pots, 50 % of whose buds, in consequence of the heat, never opened; the Box, used in borders, (*Buxus sempervirens suffruticosa*) the Leek, Carrots, Cabbages, Beans, Salads, etc., all of which were seriously injured by the heat.

C. L. GATIN. **Experimental Production of the Effects of Road-tarring on Plants.** (1) (Reproduction expérimentale des effets du goudronnage des routes sur la végétation avoisinante). — *C. R. de l'Acad. des Sciences*, T. 153, N. 15, pp. 688-690. Paris, 9 Octobre 1911. 3227

The writer has studied the action of dust collected from tarred roads on the following plants: Sycamore, Syringa, Walnut, Elm, Snowberry, Flowering Currant, and "Virago" Rose. France

(1) A résumé of a previous paper by M. Gatin appears as Abstr. 2271 of this *Bulletin*, July 1911. (*Ed.*).

The experiments were carried out at the nursery at Longchamps ; the leaves were dusted with bellows once a week from July 1st to 18th ; then two or three times a week up to Sept. 15th. The dusting was preceded by a light watering, and was carried out in the evening.

All the plants were affected. Elm and Walnut showed scorching of the leaves ; young leaves of Maple showed swellings or holes, while the old ones were browned ; leaves of Flowering Currant, Snowberry, Rose, and Syringa turned brown, and the young shoots of the last two were stunted.

From these experimets it may be affirmed that the dust from tarred roads can produce serions injury to woody plants, the nature of the injury varying with the species. It is quite possible that the vapours given off while tarring is being carried out may also have an effect.

Further, experiments at a florist's in the city showed that certain herbaceous plants (Zinnias, Ageratums, Ivy-leaved Geraniums, *Salvia splendens*) were less affected by tar-dust when they were protected from the sun.

3228 I. R. **The "Garrof" a Disease of the Quince: Means of Combating it.** (Una enfermedad del melocotonero y su curación). — *Revista del Istituto Agricolo Catalán de San Isidro.* Año LX. Cuad. 20, pp. 317-318. Barcelona, 20 de Octubre de 1911.

The years 1910 and 1911 were fatal to the quince-tree in the plain of Llobregat in Catalonia. During the greater part of 1910, **Spain** the plantations suffered from the disease known as the "garrof", characterised by fleshy, yellowish, blistered leaves ; these phenomena not having been caused by the attacks of any insect.

The disease was pretty general in the district, principally at Molins de Rey and Sant Vincens des Horts.

At Molins de Rey the disease was conquered by employing a solution of 3 kg. of sulfate of copper mixed with 1 kg. of treacle to every hectolitre of water. With this the trees were twice sprayed at a few days interval, when the winter was well advanced, but before the buds had begun to open.

CH. ARRENGER. **On the Employment of Sulphate of Iron for Combating Chlorosis in Fruit-Trees** (1). (Sur l'emploi du Sulfate de fer pour combattre la Chlorose des Arbres fruitiers). (Le Congrès pomologique de Tours). — *Le Jardin*, 25e année, No. 592, pp. 317-319, fig. 182. Paris, 20 Octobre, 1911. 3229

Among the questions under discussion at the Pomological Congress at Tours (30th September-3rd October), that of the employment of sulphate of iron for combating chlorosis in fruit-trees gave rise to the statement of fresh theories by Mons. Opoix, from Luxembourg, corroborating those already expounded by him last year at the Congress at Lille and verified by the experiments of other pomologists who, like himself, recognise the method of applying sulphate of iron to the soil to be inferior to the treatment by holes made either in the trunk or branches of the trees, and filling them with powdered sulphate ; and this is more successful in the case of stone fruit than hard fruit, and in damp rather than in dry soil. After the operation, Mons. Opoix at once applies strong manure consisting of a layer 4 in. deep of stable manure, having first removed the same depth of earth. France

Mons. Pitral made these perforations in the trunk of Plane-trees attacked by chlorosis when in full vegetation, and the planes become perfectly green again.

Mons. Rouhaud mentions the same experiments made on Acacias in Greece by Mons. Sanitas with excellent results ; and he himself successfully treated a pear-tree in the same manner, in spite of the great heat.

According to Mons. Opoix, this kind of work should be done in May, June and July, whilst Mons. Lécolier is of opinion that better results are obtained in winter.

Mons. Nomblot attempted to discover whether the success of this treatment were due to the action of the sulphuric acid or of the iron; his experiments proved it to be the latter. He then came to the conclusion that iron freed from sulphuric acid must be chosen in order to avoid burning the inside of the wood itself; and obtained most satisfactory results by using tartrate of iron.

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(1) See also p. 155 *Bull.* Nov. 1910; Abstr. 1280 *Bull.*, April 1911 and Abstr. 2275 *Bull.* July 1911.

Parasitic Diseases. — Generalities. — Parasitism. — Parasitic and Saprophytic Bacteria and Fungi. — Resistant Varieties. — Remedies.

3230 G. B. TRAVERSO (Segretario). **First Phytopathological Congress in Italy.** (Atti del primo Congresso dei Fitopatologi italiani. Torino, 10 Settembre 1911). — *Bollettino quindicinale della Società degli Agricoltori italiani*, anno XVI, N. 19, pp. 686-699. Roma, 15 Ottobre. 1911.

Under the auspices of the directors of the joint Phytopathological Observatoires of Turin, Alba and Casal Monferrato, the
Italy first Congress of Italian Phytopathologists was held at Turin on the 10th of September 1911, the president being Professor G. Cuboni, of the Royal School of Vegetable Pathology in Rome.

The following questions were fully discussed: Phytopathological Observatories (M. Voglino); Proposal as to the adoption of standard schedules for phytopathological observations (G. B. Traverso) (1). Necessites of phytopathological jurisprudence (A. Trotter); Organisation of studies and the diffusion of information as to the diseases of plants (I. Zannoni).

Then the Meeting approved the submission of a report to the Minister of Agriculture. This was drawn up by a special committee consisting of Professors G. Cuboni, president, P. Voglino, L. Montemartini, A. Trotter and G. B. Traverso, secretary.

This report first of all lays stress on the necessity for a clear, simple, law, effectual in the organization and administration of the

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(1) Here the Congress was reminded that as early as 1909 the International Institute of Agriculture proposed having international statistics of the diseases of plants, and to this end exhibited the model of a schedule comprising all the most useful information. See : *Institut International d'Agriculture. Rapport de la deuxième division à la deuxième Commission permanente, vol. III* (Note de M. le Dr. J. M. SAULNIER, *Sur l'organisation du Service des maladies des plantes*). (*Ed.*).

business of observing the diseases of plants. In order that this law may be thoroughly carried out, it seems necessary to create phytopathological Observatories in Italy on the model of that of Turin (1).

The object of these institutions ought to be to draw attention as soon as possible to the appearance of all diseases in plants, to collect with unity of method as many facts as possible as to the causes and the development of these diseases, to give advice as to the most suitable remedies, and in fine to spread the knowledge thus gained throughout agricultural districts.

Travelling Lectureships of Agriculture, antiphylloxera Syndicates, practical Schools of Agriculture and all the other agricultural Institutions, by promptly giving notice of the appearance of diseases and by giving information, specimens, etc. to the Observatory of the affected region, might ensure its regular working. On the other hand the Observatory, whenever necessary, should apply to the special High Schools, such as the Royal School of Vegetable Pathology in Rome, the Laboratory for cryptogamic research Station of Pavia and the Royal School of Agricultural Entomology at Florence.

The Observatories should be under the superintendance of a special section of the Ministry of Agriculture, entrusted with the general arrangement of facts furnished by the different observatories, and with the publication of a monthly Bulletin which should be widely distributed. Besides, every Observatory should publish its own Bulletin.

The financial means necessary for the establishment and administration of the Observatories should be supplied, not only by the Ministry of Agriculture but by the local bodies who at present provide, for the Travelling Lectureships of Agriculture. In any case the sums required would be very small because the Ministry could avail itself of the already existing Institutions (Observatories, Laboratories, and Schools of Phytopathology, Schools of Agriculture, of Viticulture etc.) in the greater part of the Italian regions, temporarily uniting those regions where no government institutions exist to the adjoining regions provided with them.

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(1) See Abstr. 2962-2964 *Bull.* Aug.-Sept.-Oct. 1911. (*Ed.*).

3231 A. Olmo. **Plant Diseases in the Neighbourhood of Turin, Italy.** (Osservatorio consorziale di Fitopatologia di Torino. Bollettino del mese di di Settembre 1911) (1). — Extract from *L'Economia rurale*, official organ of the "Consorzio Agrario del Circondario di Torino", 3 pp. Torino, Ottobre 1911.

Italy

In September 1911 the following diseases were specially prominent: *Nectria cucurbitula* Fr. on Fir and Larch; *N. cinnabarina* (Tode) Fr., on Horse Chestnut; *Diaspis pentagona* T.T., on Peach; *Cossus Cossus* L., on Poplar; *Phoma longissima* (Pers.) West., on Fennel; *Sclerotinia Libertiana* Fckl., on Lupin; *Bruchus Pisi*, on Green Peas; *Septoria Petroselina* Desm., on Parsley.

3232 H. Müller-Thurgau. **Infection of Vines by Mildew.** (2) (Comment la Vigne est elle infectée par le Mildiou?). — *Le Progrès agricole et viticole*, 28me An., N. 39, pp. 367-371, and N. 42, pp. 454-459. Montpellier, 24 Septembre et 15 Octobre 1911.

Switzerland

In numerous experiments with spores of vine mildew (*Peronospora viticola*), the writer has never succeded in getting infection to start on the upper surface of the leaves, the fungus appearing unable to penetrate into the tissue; on the under surface, infection generally results when the spores are placed in small drops of water; penetration is by means of the stomata.

The writer then proceeds to consider whether spraying the upper surface of the leaves with copper mixtures, however carrefully carried out, is a sufficient remedy for mildew, though it is everywhere recommended. No doubt it would be so, if, as some still hold, a sufficient quantity of copper were to enter the tissues, and prevent the development of the mycelium there. But considering the great sensitiveness of the parenchyma cells to toxins, this seems highly improbable. It seems, then that it would be better to spray the fungicides on to both surfaces, or even to treat only the lower surface, since it is only there that infection takes place.

(1) See Abstrs. 2962-2964, *Bull.* Aug.-Sept.-Oct. 1911. (*Ed.*).

(2) Cp. A. Bruttini. *A proposito del modo di diffusione della Peronospora della Vite*, Boll. quindic. della Soc. degli Agric. Ital., anno XVI, No. 21, pp. 822-823 Roma. 15 Nov. 1911.

The writer made experiments on this subject on vines in pots out of doors, of the varieties " Chasselas " and " Bourgogne " (" Pinot noir ").

Three plants of each variety, as much as possible alike in conditions and development, where chosen : the first received no treatment, the second were sprayed with Bordeaux mixture on the upper surfaces of the leaves, the third were sprayed on the under surfaces. All the leaves were then sprinkled on the under surfaces with drops of water containing fresh conidia of *Peronospora*.

Of " Chasselas ", plant 1) showed 424 out of 473 infections (89 %), plant 2) 238 out of 346 (69 %), and plant 3) none out of 414; with " Bourgogne ", plant 1) gave 290 infections out of 301 (96 %), plant 2) 273 out of 366 (74 %), and plant3) none out of 515.

The writer has not in any case succeeded in getting infections on the upper surface, either along the veins, where a certain number of stomata occur, or on cuts in the upper epidermis.

He found that vines kept for a certain time in damp air showed no special disposition to fresh leaf-infection ; whilst wines growing in constantly moist soil were more readily infected than those in dry soil.

G. Trinchieri. **New Fungi on Ornamental Plants** (1). (Nuovi micromiceti di piante ornamentali. Nota III). — *Bollettino dell'Orto botanico della R. Università di Napoli*, T. III, 8 pp. Napoli, 1911. **3233**

In his third contribution to the study of microscopic fungi attacking ornamental plants Dr. Trinchieri describes as new to science the following species from the Royal Botanic Garden at Naples : **Italy**
Phyllosticta Ardisiae sp. nov., on *Ardisia humilis* Vahl ; *Ph. osmanticola* sp. nov., on *Osmanthus fragrans* Lour. (= *Olea fragrans* Thunb.); *Gloesporium sycophilum* sp. nov., on *Ficus elastica* Roxb. and *Macrophoma Anthurii* on *Anthurium Hookeri* Kunth.

The three first-named species cause considerable injury to the leaves of their host plants.

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(1) See also Abstr. 297, *Bulletin*, Jan. 1911. (*Ed.*).

3284 W. A. ORTON. **The Raising of Disease Resisting Plants.** (1) (The Fourth International Conference on Genetics, Paris. September 18-23). — *The Gardeners' Chronicle* No. 1295, Vol. 4. p. 286. London, October 21, 1911.

In a memoir presented to the Fourth International Conference on Genetics at Paris, Mr. W. A. Orton has dealt with the problem of **United States** disease in plants, and has described the results of experiments in breeding varieties resistant to specific diseases. The experiments (which were made by the United States Department of Agriculture) concerned, mainly, the group of diseases known as " wilt diseases " which are due to parasitic species of the genus *Fusarium*. Thus *F. vasinfectum* Atk. is responsible for wilt in cotton ; *F. tracheiphilum* Erw Sm., gives rise to the wilt of the cowpea (*Vigna unguiculata*), and *F. niveum* Erw. Sm., to the wilt of the Water Melon (*Citrullus vulgaris*). *Fusarium* is a genus of parasitic fungi, the species of which are highly specialised, and live in the vascular tissues of their respective hosts. Infection takes place from the soil through the young roots, and occurs independently of conditions, favourable or otherwise, in which the host plant is growing.

Among cotton plants, the degree of resistance to wilt is generally but slight, though occasionally a cotton plant is met with which is immune. By self-fertilization of such a resistant plant, strains of plants have been raised which have maintained their powers of wilt resistance for several years.

Mr. Orton's experimental breeding work with the Cowpea (*Vigna unguiculata*) has shown that, in the first place, a variety may exhibit resistance to the attack of more than one kind of parasite. Thus, a variety, " Ivon ", has proved to be immune of the attack of the wilt-fungus (*Fusarium tracheifilum*), and also from root-knot, the disease caused by the eelworm (*Heterodera radicicola*). When the resistant variety " Ivon " is crossed with high-yielding but susceptible varieties, the resulting hybrids (F_1) are resistant, and with F_2 , plants are obtained which combine this quality with that of the high yield characteristic of the other parent.

The problem of discovering wilt-resistant varieties of water melon (*Citrullus vulgaris*) was rendered difficult by the fact that none

(1) Cf. Abstr. 2288 *Bull.* July 1911; Abstr. 2970 *Bull.* Aug.-Sept.-Oct. 1911. (*Ed.*).

of the edible varieties is immune. It was therefore necessary to start with a non-edible resistant variety and to cross it with the better varieties in cultivation. In F_1 the hybrids showed qualities intermediate between those of the parents, F_2 exhibited great variability; but in the third generation (F_3) a race was obtained which was resistant to wilt and of edible quality. Subsequent selection during 5 years has resulted in the isolation of a variety, "Conqueror", which leaves nothing to desire with respect to resistance and general quality. This variety is not resistant in all regions. Thus it is immune from wilt when grown in South Carolina and Iowa, but loses its resistance in Oregon. This fact shows that, in attacking the problem of raising disease-resisting forms, locality must be taken into consideration..

Japanese Millet: a Rust-resistant Variety. — See above, Abstr. 3139 **3285**

Rhodesia

SALAMAN. **Disease Resistance in Potatoes** (1) (The Fourth International Conference on Genetics, Paris). — *The Gardeners' Chronicle.* No. 1295, Vol. L. p. 286. London, October 21, 1911. **3286**

Mr. Salaman, in the course of a paper on the breeding of the potato presented at the Fourth International Conference on Genetics held in Paris from 18 to 23 September 1911, described the results which he has obtained by raising seedlings from *Solanum tuberosum*, among which a certain number of plants immune from "late blight" (*Phytophthora infestans*) were obtained. **France**

(1) See also this *Bull.* Dec. 1910, p. 248; and March, 1911 No. 996-997. (*Ed.*).

3237 E. MIÈGE. **The Treatment of Seed with Hydrogen Peroxide** (1) **and Hollyhock Rust *(Puccinia Malvacearum)*** (2). — *The Gardeners' Chronicle*, Vol. L, No. 1292, p. 242. London. September 30, 1911.

France

Experiments by Mr. E. Miège (*Ann. Ecol. Nat, Agric. Rennes*, II., 1910) on the effect of hydrogen peroxide on the germination of seeds, indicate that, though this substance is poisonous when used in strong solutions, dilute solutions facilitate germination and stimulate the seedlings to more active development than that exhibited by untreated plants. Mr. Miége concludes also from his experiments that hydrogen peroxide, (1 per cent.) is a useful fungicide in which to steep seed affected by rust or smut. Immersion of infected seed for a quarter of an hour in a 1 per cent. solution of hydrogen-peroxide is stated not only to destroy the fungus spores, but also to protect the seedling from attack. It would be worth while to try the effect of this specific on " Hollyhock rust " (2).

3238 C. FUSCHINI. **On the possible Influence of Ferrous Sulphate on the Rusts of Plants.** (Il solfato ferroso esplica un'azione utile contro le ruggini delle piante? Nota preliminare). — Extract from *La Rivista*, organ of the " R. Scuola di Viticoltura e di Enologia di Conegliano ", p. 7. Conegliano, 1° Ottobre 1911.

Italy

In 1910-1911 the writer undertook a series of experiments on wheat and beans with a view to determining the action of ferrous sulphate on the rusts attacking these crops. The ferrous sulphate was applied, before sowing, at the rate of 2 qls. per hectare (1.6 cwt. per acre) for wheat, and 3 qls. (2.4 cwt.) for beans.

With wheat there was no distinct difference between the treated and control plots; with beans the following results were obtained;

	Haulm		Grain	
	qls. p. ha	cwt. p. ac.	qls. p. ha.	cwt. p. ac.
Plot treated with ferrous sulphate	10.32	8.21	9.80	7.60
Control plot	7.60	6.05	7.40	5.90

(1) See Abstr. 795 *Bull.* March 1911.

(2) " Hollyhock rust " = *Puccinia Malvacearum* Mont., " Rouille des Mauves ". Cf. G. MASSEE, *Diseases of cultivated Plants and Trees*, p. 310, London, 1910. (*Ed.*).

Without making a definite pronouncement on the subject, the writer is decidedly of the opinion that ferrous sulphate, applied as a manure before sowing, is of use against rust in crops. The variable proportions of the different ingredients of cultivated soil very likely tend to exaggerate or diminish this action, which would appear to consist in a general increase of the vigour of the crop, so that the plants can better resist the attacks of disease-producing organisms.

E. CHUARD. **Copper Oxychloride for Use as a Fungicide on Vines** (1). (L'Oxychlorure de cuivre dans les traitements anti-cryptogamiques des Vignes). — *Journal d'Agriculture pratique*, 75me An., T. II, No. 38, pp. 374-375. Paris, 21 Septembre 1911. 3239

The writer remarks that what led him to introduce copper oxychloride into spraying practice was the possibility of considerably reducing the amount of copper applied. This reduction is at least 50 %, and is due to the greater efficacity of the oxychloride, depending on its power of becoming gradually soluble. In other words, experience has shown that 1 part of dry oxychloride, at 50 % copper, is equivalent to 4 parts of sulphate, at 25 % copper. Consequently the quantity of copper that may get into the vat with the grapes is always less than in the case of those treated with the ordinary copper mixtures. France

The investigations of Quantin and the writer have shown that the elimination of the small quantities of copper which may get into the the vat is made certain by the small amount of sulphuretted hydrogen which is regularly set free in alcoholic fermentation. Owing to this elimination, which may almost be called automatic, copper never occurs in wine, even after numerous or late copper-treatments. Treatments with oxychloride offer even less danger, as they employ less copper.

With oxychloride, barium chloride can be used as insecticide, without any action occuring between the two substances.

(1) See Abstr. 1537, *Bull.* May 1911. (*Ed.*).

Parasitic Diseases of Various Plants and Means of Prevention and Control (1).

3240 France **Fungus Diseases of Rye.** — See below, Abstr. 3266.

3241 France **Fungus Diseases of Peas.** — See below, Abstr. 3272.

3242 F.J. CHITTENDEN. **"Leaf Spot" of Celery.** — *Journal of the Royal Horticultural Society.* Vol. XXXVII Part. I pp. 115-122. London, October 1911.

Great Britain During the years 1909 and 1910 celery was attacked to a remarkable extent in many parts of England by the fungus *Septoria Petroselini* var. *Apii* Briosi et Cavara (2). The disease appears to be of comparatively recent introduction in Great Britain and to be spreading far and rapidly each year.

The following points are discussed in the article under review: Severity of the attack; symptoms of the disease; the fungus implicated; distribution of the fungus on celery.

3243 **Black Currant Rust.** — *The Gardeners' Chronicle.* Vol. L. No. 1289, p. 189. London, September 9. 1911.

Great Britain This rust is frequently met with in fruit plantations towards the end of the summer. The fungus which causes it is called *Cro-*

(1) The plants are arranged in the same order as in the first part of this *Bulletin.*

(2) See Also this *Bull.* July, 1911, Abstr. 2305.

nartium ribicolum (1), and it has an interesting life-history. Like *Puccinia graminis*, the black rust of cereals, *Cronartium ribicolum* is a heteroecious parasite, i. e., it lives on two different host plants at different stages in its life-history. In the case of *Cronartium ribicolum* the two hosts are the Weymouth Pine (*Pinus Strobus*) and the Black Currant. The spores produced on this Pine earlier in the year infect the leaves of the Black Currant on which the fungus forms two other kinds of spores—uredospores and teleutospores. The uredospores first occur in small pustules on the under surface of the leaf, but later their place is taken by the teleutospores, columns of which appear as small, brownish and hair-like projections. Unlike the teleutospores of many other fungi, these spores germinate at once, forming other spores, which in turn infect the Weymouth Pine. The writer has only once seen this rust on Red Currants, and in this case the Red Currants were near Black Currants, which were badly infected with the parasite. The uredospores of this rust have the power of infecting Black Currant leaves again, but whether they are capable of retaining their vitality throughout the winter, is uncertain. The recurrence of this rust in Cambridgeshire year after year is remarkable, because the Weymouth Pine is not a common tree in the county, and he present winter has not seen a specimen of it affected with the rust.

Rots Attacking Grapes Stored Fresh. — See above, Abstr. 3155. **3244 France**

Fungus Diseases of Olive in the Province of Jaén, Spain. — See below, Abstr. 3251. **3245 Spain: Jaen**

P. T. Brooks. « **Plum Rust** » ***(Puccinia Pruni).*** (*New Phytologist*). Ref.: *The Gardeners' Chronicle*. No. 1,295, Vol. L, p. 292. London, October 21, 1911. **3246**

The writer has shown that the fungus causing « Plum Rust » is heteroecious in Great Britain, the alternate host being *Anemone coronaria*. « When spores from *Aecidium punctatum* occurring on *Ane-* **Great Britain**

(1) See Abstr. 987 *Bull.* March 1911 and Abstr. 1928 *Bull.* June 1911. (*Ed.*).

mone coronar a last spring were applied to the leaves of a young Victoria plum tree, the rust appeared in almost every case, thus showing that *Aecidium* on *Anemone* is really a stage in the life-history of plum rust (*Puccinia pruni*). During the last few years there have been severe epidemics of plum rust in fruit-growing districts, the attack in places being so severe as to cause premature defoliation of the trees ». Hitherto there has been doubt as to the manner in which the fungus survives the winter in Great Britain. Two kinds of spores are produced on plum leaves, uredospores and teleutospores. The former may possibly survive the winter and give rise to the rust again the following summer. It is, however, as yet uncertain whether this is a frequent means of propagation from season to season. Indeed, if re-infection the following year were due only to uredospores one would rather expect plum rust to develop soon after the foliage has appeared, whereas this rust is not in evidence until the summer season is well advanced. Experimental proof is lacking that the teleutospores can re-infect plum leaves, and such a result is unlikely, for the primary function of these spores is to infect plants of *Anemone coronaria*. The writer's experiments show that there is another means by which the fungus can survive the winter, and thereby cause a recurrence of the rust. *Anemone coronaria* is a plant frequently found in gardens, and the mycelium of *Aecidium punctatum* is perennial in its tissues. Thus a plant once affected with this fungus gives rise to crops of aecidiospores year after year so that a few plants affected by the *Aecidium* are sufficient to account for the recurrence of the disease. After the first crop of uredospores of the season has been produced on plum leaves the fungus may spread rapidly, because successive crops of these spores may be formed about every fortnight under favorable conditions. Plants of the *Anemone* affected by the fungus have more fleshy leaves than have healthy plants, and diseased plants very rarely flower. It is obvious that the eradication of plants of *Anemone coronaria* affected by the *Aecidium* will be of assistance in the control of this very common rust.

3247 France **Diseases of the Fig Tree.** See below No. 3276.

3248 France **Diseases of the Mulberry.** See below No. 3277.

PAUL NOEL. **Dry Rot** (***Merulius lacrymans***) (1). (Le Mérule pleureur). **3249**
— *Bull. du Laboratoire régional d'Entomologie agricole*, 4ème trimestre de 1911 (Oct.-Nov.-Dec.), pp. 11-12. Rouen, 1911.

In the parts of Normandy liable to floods, particularly near the Seine, dry rot does a great deal of damage to woodwork in cellars.

It appears that flood water plays an important part in carrying **France** the spores of the fungus from cellar to cellar.

The writer finds that corrosive sublimate solution at 1 gm. per litre (1/6 oz. per gallon), applied to woodwork with a brush or sprayer, is a good preventive; when treatment is carried out after a flood, the woodwork must first be washed. He considers that casks, bottles, and walls may be treated without danger.

(1) Cp. Abstr. 1301 of this *Bulletin*, April 1911. (*Ed.*).

Phanerogamous Parasites and Weeds. Their Control.

3250 **" Broom-Rape " (*Orobanche*)** (1). — *Board of Agriculture and Fisheries, Leaflet.* No. 226, p. 4. London, August 1909, Revised, September 1911.

The broom-rapes are included botanically under the order *Orobanchaceae*, of which there are 11 genera, and according to Bentham and Hooker 150 species; of these about 100 are members of the genus *Orobanche* (or " broom rapes "). Few of them, however, occur in the British Islands.

Great Britain

The " Lesser Broom-rape ", *O. Minor* Sutt., is the species which is the farmer's special trouble, as it attacks clover, and may do great harm when established amongst that crop. It occurs on a variety of plants, and is found southwards from the Border counties. It is recorded by Kirchner as occurring in Germany on *Trifolium repens*, *T. hybridum*, *T. pratense*, *T. incarnatum*, Serradella, *Lotus corniculatus*, Carrots and " Fuller's Teasel " (*Dipsacus fullonum*). *O. Rapum-genistae* Thuill., known as " Larger Broom-rape ", is found in Great Britain from Dumfries southward, in Ireland, and in the Channel Islands. It is parasitic on the roots of a few shrubby leguminous plants, such as broom and gorse.

Hemp is occasionally infested with *O. ramosa*, whilst on the continent it attacks tobacco. *O. major*, Linn. (= *O. elatior* Sutt.) is parasitic on composites.

Hooker says it is parasitic on *Centaurea Scabiosa*, but it is rare. It is found, chiefly in the Eastern counties, from York and Durham to Sussex and Somerset, and also in South Wales.

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(1) Cp. Abstr. 338 *Bull.* January 1911; Abstr. 589 and 642 *Bull.* February 1911; Abstr. 1887, 1938 and 1951 *Bull.* June 1911. (*Ed.*).

Several other species occur in Great Britain, but they are of no agricultural importance.

Several hundred seeds are produced from a single flower. Sorauer quotes Wentz as having seen 70 to 90 seed capsules, containing on an average 1500 seeds, on a single plant.

Prevention and Remedy. — 1. The chief means of preventing infection on clean farms undoubtedly lies in using absolutely clean seed, free from weed seeds.

2. Wherever the plant is seen it should be pulled up. Stebler, however, quotes a case in which after plants had been removed by hand the pest again shot up. When the pest occurs only in small patches it may be dug out and burnt. Sorauer says that in case of widespread infection prevention of seeding is the chief method of combating broom-rape, because spreading by shoots or scions is slow and easily preventable by uprooting the plants.

3. Clover should not be grown on badly infested land until after the lapse of a number of years.

4. Manures which will encourage the growth of the clover and aid it in resisting the attack may be employed with advantage. Ground lime and potash manures may be of value in this way.

5. Red clover when badly attacked by broom-rape (*O. minor*) may be replaced by lucerne or sanfoin. The sowing of " Italian rye-grass " (*Lolium italicum*) with clover has been found useful, as it grows rapidly after the first cut and retards the growth of the broom-rape. Heavy-yielding varieties of red clover are valuable, their strong, luxuriant and rapid growth tending to suppress broom-rape (1).

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(1) Experiments carried out in Italy would seem to show that, in dealing with the bean *Orobanche*, no satisfactory result has been obtained either from treating the seeds with anticryptogamic substances, or from pulling up the plants, or from burning them.

Professor Passerini's experiments have shown that the intervals between successive bean cultures ought to be very long, to make such a method effective. See G. NORI, *Contro l'Orobanche. Giornale di Agricoltura della Domenica*, Piacenza: 20 Nov. 1910. (*Ed.*).

Insects and other Injurious Invertebrates. Their Biology and Control.

3251 LEANDRO NAVARRO. **Report on Insects and other Organisms attacking Olives in the Province of Jaén, Spain.** (Informe relativo a las plagas de los olivos en la provincia de Jaén). — *Boletin de Agricultura tecnica y economica, Organo oficial de la Dirección de Agricultura, Minas y Montes*, Año III, N. 33, pp. 797-809, Madrid, 30 Septiembre de 1911.

Spain

On the 21st of July 1911, the director of the Agricultural Station ("Ingeneiero-Jefe de la Seción Agronomica") of the province of Jaén sent out circulars to the heads ("Alcades") of the communes asking for information under the following headings: name of commune, altitude above sea-level, nature of diseases affecting olive-yards, intensity of the diseases, length of time they have been present, parts of the tree sent for examination, observations (on the state of the olive-yards, methods of harvesting, etc.). Out of 99 communes, 78 sent in replies, which may be summarized as follows:

The most serions diseases in the province of Jaén, in order of importance, are: *Phlocothrips Oleae* (1), commonly, but wrongly, called "Palomilla"; in other places it is called by the more appropriate names of "Barrenillo" and "Escarabajuelo"; the disease caused by the larvae of *Prays oleae lus;* that caused by *Psylla Oleae*, known as "Algodón de los olivos"; also, here and there, damage by *Cycloconium oleaginum* and *Bacillus oleae.*

The first is much the most important. In Spain, as in other countries, *Ploeothrips* appears first in the highest plantations, and

(1) Cp. Abstr. 1594, *Bull.*, May 1911. (*Ed.*).

spreads later to the plains. By paying more attention to pruning, and removing the wood cut out, the damage caused by the " Palomilla " could be greatly reduced. The southern part of the province is most severely attacked by this insect; the area infested is estimated at 540 hectares (1335 acres), with 620 425 trees. Reckoning the cost of four treatments necessary against this insect at 1 fr. 30 (1s) per tree, the total cost will be about 806 500 fr. (£31 900); to this must be added the cost of the insecticide, about 0.30 fr. (3*d*) per tree.

C. L. Marlat. **Brown-tail Moth (*Euproctis chrysorrhoea*) a Dangerous Pest** (1). — *Oklahoma Farmer*, Vol. XXI, No. 14, p. 7. Guthrie, Oklahoma, October 15, 1911. 3252

Early in 1909 it was discovered that nests of the " brown-tail moth " (*Euproctis chrysorrhoea*) were being introduced into the United States on imported European nursery stock—chiefly from Northern France—and distributed into many states. United States

These brown-tail-moth nests were first reported in connection with a consignment of seedlings shipped from Angers, France, to New York.

Special arrangements were made by the chief of the Bureau of Entomology with the Customs Office, and by agreement with the railroads, so that the Bureau was to be informed of all cases of plants received at customs or subsequently handled by the principal railroad companies. By this means the receipt and ultimate destination was ascertained of much of the imported stock of that year. Information was secured concerning nearly 800 shipments, divided among 34 different states. In shipments to fifteen of these states, nests of the " brown-tail-moth " were found, ranging in number from one nest to many nests in each shipment.

Shipments of nursery stock from France in 1910 again brought to the United States enormous quantities of nests of the " brown-tail-moth ", filled with one-fourth grown larvae.

All of this imported European stock was again followed up as far as possible and all reported shipments were inspected at their

(1) Cp. Abstr. 656 *Bull.* February, 1911; Abstr. 1294 *Bull.* Avril 1911; Abstr. 1962 *Bull.* June 1911; Abstr. 3025 *Bull.* August-September-October 1911. (*Ed.*).

destination. Of the shipment of 1910 not less than 291 different lots were found to be infested with nests of the " brown-tail-moth ". As a result of a thorough investigation of European conditions, a much better effort during the last year has been made, notably in France and Belgium, to improve the conditions of import stock, and as a result the importations of the present season so far have shown a notable improvement in amount of infestation.

3253 **" Mediterranean Fruit Fly " *(Ceratitis capitata)* in Hawaii** (1). (Mediterranean Fruit Fly worst of all Pests). — *California Fruit Grower*, Vol. XLIV, No. 1215, p. 7. San Francisco, October 21, 1911.

E. K. Carnes, Superintendent of the State Insectary of California, has been in Hawaii studying the Mediterranean Fruit Fly (*Ceratitis capitata*). As a result of his report, the State Horticultural Commissioner has forbidden the importation into California of pine apples or bananas wrapped either in " Hilo grass " or in banana leaves, as these grow in thickets around and intermixed with the " guava ", which is badly infested with the fly, and it is possible that the insect might be brought into the State in this way. Pine-apples and bananas done up in rice cloth or other wrappings, in which there is no danger that the pest may be concealed, are not included in the prohibition.

United States Hawaii.

The work of combating the fly has been commenced by the people of Honolulu, who have raised 8 500 dollars (44 030 francs) for incineration and other expenses, and have appointed inspectors to co-operate with the Board of Health, and now all of the infected fruit in the vicinity of Honolulu is to be picked and burned.

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(1) Cp. p. 375 *Bull.* Dec. 1910; Abstr. 2028 *Bull.* June 1911. (*Ed.*).

JOHN B. SMITH. **Noctuidae of California (*Pantheinae, Raphia and Acronycta*).** — *Pomona College Journal of Entomology*, vol. III, No. 3, pp. 558-567. Claremont, California, U. S. A., September, 1911. **3254**

After discussing the sub-families of *Pantheinae*, the writer treats of the genera *Raphia*, *Acronycta*, *Merolonche* and *Arsilonche*, and gives descriptions of the following species: **United States: California**

Acronycta hastulifera S. & A.
» *hesperida* Smith.
» *felina* Grt.
» *frigida* Sm.
» *cyanescens* Hamps.
» *pacifica* Sm.
» *mansueta* Sm.
» *tritona* Hbn.
» *quadrata* Grt.
» *liturata* Sm.
» *marmorata* Sm.
» *noctivaga* Grt.
» *perdita* Grt.
» *othello* Sm.

It is stated that the Californian species of the genera here included are not well known, and that it is very likely that the list will be materially increased when proper collecting has been done.

E. O. ESSIG. ***Aphididae* of Southern California.** — VII. *Pomona College Journal of Entomology*, vol. III, No. 3, pp. 523-557. Claremont, California, U. S. A., September, 1911. **3255**

Accurate descriptions and drawings and notices concerning literature, synonymy, host plants, natural enemies and methods of control are given for each of the following species: **United States: California**

Aphis Brassicae L. (« Cabbage Louse »); *A. Ceanothi-hirsuti* n. sp.; *A. Medicaginis* Koch.; *A. Nerii* Fonscolombe (« Oleander Aphid »); *Chaitophorus salicicola* n. sp.; *Hyadaphis Pastinacae* (Linn) Schout; *Idiopterus Nephrolepidis* Davis; *Lachnus Juniperi* De Geer. (« Juni-

per Louse ») ; *Macrosiphum albifrons* n. sp. (« Lupin Aphid ») ; *M. frigidae* Oestlund (« Artemisia aphid ») ; *M. laevigatae* n. sp. ; *M. Rosae* (Linn.) Schouteden (« Rose Aphid ») ; *Pemphigus Fraxini-dipetalae* n. sp. (« California Mountain Ash Louse »).

3256 ANDREAS BOUYAT. **Insect Parasites of Trees and Herbaceous Plants in Uruguay.** (Los insectos parasitos de los arboles y plantas). *Revista de la Associación rural del Uruguay*, 10. *Congreso Rural*, Año XL, N. 9, pp. 707-718. Montevideo, Septiembre del 1911.

On the occasion of the 10th Uruguay Agricultural Congress Señor Bouyat read a paper on the principal insects damaging crops in Uruguay. He described the life-history of each, with the damage caused, methods of treatment, natural enemies, etc.

Uruguay

The following species were dealt with : *Papilio thoantiades*, damaging mandarin-orange, related to the Cuban *P. Thoas* (known as " Perro del naranjo " in Cuba) ; *Lecanium hesperidum* (" Pulgones del naranjo "), and *Mytilaspis citricola* (" Kermes coma "), attacking orange ; *Pieris antodice*, whose larvae devour the young leaves of garden plants ; *Epicauta adspersa* (" Bicho moro "), attacking chard beetroot ; *Cohas Lesbia*, attacking lucerne ; *Solanophila paenulata*, on pumpkins, melons and other Cucurbitaceae ; *Bruchus Pisi* and *B. rufimanus*, attacking the seed of cultivated pulse crops ; *Gryllotalpa* (" Grillo topo "), which burrows into tubers and roots ; *Diaspis pentagona*, which does serious damage to peach ; *Trachyderes Morio*, *Orthostoma aullicus*, and *Compsacerus barbicornis*, which nibble the pulp of peaches ; *Schizoneura lanigera* (" Pulgón lanigera ") *Mytilaspis pomorum*, and *Carpocapsa pomonella* on apple ; *Tenthredo* sp., *Megapyga urens*, *Schistocera paranensis* (' Acridio "), *Diloboderus abdorus* (" Torito "), *Oeceticus platensis* (" Bicho del cesto "), attacking various fruit-trees ; *Phylloxera vastatrix* and *Margarodes Vitium*, attacking vine.

The lecturer also laid emphasis on the necessity for regular and systematic study of the injurious insects of Uruguay.

C. C. GOWDEY. **Insect Pests in the Uganda Protectorate during 1909-1910** (1). (Report of the Government Entomologist for the Year 1909-1910 - Uganda Protectorate). 8°, pp. 24. — *Printed at the Government Press*, Uganda. **3257**

I. *Insects Injurious to Coffee.* — The " Mediterranean Fruit Fly " (*Ceratitis capitata*, Wied.) is attacking coffee in Uganda.

It is believed that the original home of this insect is Spain, from which it has been introduced to the orange growing countries. Now it is recorded from Southern Italy, Sicily, Malta, South Africa, Natal, Bermuda, New Zealand, Australia and the East of South America. From the large number of fruit flies indigenous to Africa it is probable — in the writer's opinion — that this continent is the home of the family and that *Ceratitis punctata* was introduced to the Mediterranean from Africa and not vice-versâ. **Uganda.**

Ceratitis capitata was formerly known as a pest on citrus fruits, but it has learnt to feed on almost all kinds of cultivated fruits. It is recorded as feeding on oranges, loquats (*Eriobotrya japonica*), peaches, cherries, lemons, limes, sapodillas, avocado pears, guavas, sugar apples, quinces, granadillas, star apples, figs, nectarines, coffee, Sodom apples, prickly pear, *Citrus brexifolius*, passion flowers, *Solanum nigrum*.

Destruction of fallen fruits, covering the trees with netting, and poisoned bait (treacle containing an arsenical poison) are advised as control measures. Kerosene has been used with great success in West Australia.

2. " Coffee beetle " (*Stephanoderes Coffeae*, Haged.) continues to do great damage to the coffee plantations in the Protectorate and is already established throughout the country. Insecticides are useless. Beans in which the insect has tunneled should be picked and destroyed.

This beetle has been reported (Dr. HAGEDORN *Entomologische Blätter*, pp. 1-4, 1910) also from Angola, Central Africa.

3. " Scale Insects » : *Ceroplastes ceriferus* Anderson ; *Ceroplastes sp. nov.*

These 2 species of « Scale Insects » occur in Uganda on Coffee in sufficiently large quantities to be of economic importance.

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(1) Cp. Abstr. 1035 *Bulletin*, March 1911 ; Abstr. 1944 *Bull.* June 1911. (*Ed.*).

Ceroplastes ceriferus, produces insect wax in large quantities, but the quality is unsuitable for economic purposes. It is recorded from India, Australia, Ceylon, Mexico, Jamaica and Antigua on orange, tea, mango, and *Hibiscus*. Both these species have been checked by two applications of whale oil soap in the proportion of 1 lb. of the insecticide to 4 gals. of water, made at intervals of 7 days.

II. *Insects Injurious to Cacao.* — 1. "Cacao Fruit Fly" (*Ceratitis punctata* Wied.). It is also reported (Von Roder *Berl. Entomol. Zeitschrift*, 29 Jahrg. 133, 2) from Ashanti, West Africa. Flies were reared in the laboratory from several varieties of fruit, including the mango, guava and passion fruit.

The use of a poisoned bait (3 lbs. sugar, ¼ lb. arsenate of lead, 5 gals. water), and the destruction of all infested pods are advised as control measures. An experiment was made with a decoction of the foliage of an Apocynaceous plant, *Haplophyton cimicidum*, obtained from Mexico. The decoctions (2 lbs. of the plant in 3 gals. water) were sweetened and used as a spray, but the quantity of foliage received was so small as to make positive deduction as to the value of the experiment impossible.

The plants grow wild in Mexico and decoctions have been used against the "Mexican Orange Fruit Fly" (*Trypeta ludens* Loew) with very satisfactory results.

2. "Scale Insects" (*Stictococcus dimorphus*, Newst.) are always found on the cacao pods or on the stems of the pods. Large numbers of ants are found on the attacked trees. It is a very difficult insect to control. Spraying with whale oil soap (1 lb. soap, 3 gals. water) has proved moderately successful. Resin wash is ineffective.

3. "Cacao Beetle" (*Adoretus hirtellus* Lap.) does not appear to have been as destructive as the preceeding year.

4. "Crickets" (*Gryllotalpa africana* Pal. B.). This "Cricket" has recently made its appearance in several cacao nurseries and fields newly planted out to cacao.

III. *Insects Injurious to Citrus.* — 1. "Citrus Psylla" (*Trioza* sp.) is found on orange, lime and lemon. Although not a very serious pest, young trees and the young growths of old trees sometimes suffer severely from this "Psylla". The injury to the plant is caused by the sucking of the sap by the insect and by the interfence of the respiratory functions of the leaves due to the abnormal curling of the foliage. The best method of control is the destruction of the terminals when the pest is in the larval stage. Spraying with kerosene emulsion or whale oil soap is also successful.

2. The "Orange Butterfly" (*Papilio demodocus*, Esp.).

3. The "Scale Insects" which continue to be greatly in evidence on citrus trees. and on orange in particular, throughout the Protectorate are *Mytilaspis gloveri* Pack., and *M. citricola* Pack. Applications (twice, at intervals of about 10 days) of whale oil soap have invariably proved successful.

4. "Plant Lice" (*Aphis citri* Ashm.. continue to do damage.

IV. *Insects Injurious to Garden Crops.* — 1. "Cutworms" (1) or "Surface caterpillars" have a large variety of food — plants — cabbages, tomatoes, maize, beans, potatoes — but they invariably attack only the young plants.

Poison bait of the formula: 1 lb. arsenite of soda; 8 lbs. brown sugar, 10 gals. water has met with the best success locally. (2).

V. *Insects Injurious to Cotton.* — 1. "Cotton Stainers" have proved to be the most injurious and wide-spread pest on cotton during the past year. These insects are contained in the two genera *Dysdercus* and *Oxycarenus* of the two families *Pyrrhocoridae* and *Lygaeidae*, respectively. The species occurring in Uganda are *Dysdercus nigrofasciatus* Stal., *D. pretiosus* Dist., *Oxycarenus gossipinus* Dist. and *O. hyalipennis* Costa. The *Dysdercus* spp. being large and conspicuous are generally considered to be the most prevalent and destructive (2), but *Oxycarenus hyalipennis* undoubtedly is responsible for the greatest destruction.

2. The "Cotton Bollworm" (*Earias insulana* Bois.) this season has been in considerably less evidence than in the preceding season.

VI. *Insects Injurious to Rubber.* — 1. "Castilloa Borer" (*Inesida leprosa* Fab.) has continued to be in evidence.

2. "White Ants" (*Termes bellicosus* Linn.) have frequently damaged Rubber plants. The "ant- hills" should be removed as the initial step to the control of these insects.

3. "Scale Insects" (*Pulvinaria Psidii*, Mask.). This species apparently confines its attacks to the native rubber plant, *Funtumia elastica*. Up to the present, however, it does not occur in sufficient quantity to demand any steps being taken to control it.

VII. *Insects Injurious to Sweet Potatoes.* — 1. "Sweet Potato Caterpillar" (*Acraea terpsichore*, Linn.). Within the last year the prevalence of this pest has been on the decrease. In control-

(1) Cp. Abstr. 2322 *Bull.* July 1911.

(2) Cp. Abstr. 1975 *Bull.* June 1911. (*Ed.*).

ling this pest, Paris green has been applied as a spray with great success.

2. The "Sweet Potato Weevil" (*Cylas formicarius* Fab.) has continued to cause damage.

3. *Conchyloctenia punctata*, Fab., var. *parummaculata* Boh. has done considerable damage to sweet potatoes in certain restricted localities. It is apparently a new pest on this crop in the Uganda Protectorate. A large percentage of the eggs of this beetle are parasitized by a minute chalcid.

VIII. *Insects Injurious to Palms.* — 1. "Palm Weevil" (*Rhynchophorus phoenicis* Fab.). The beetles have been found in practically all the species of palms occurring in Uganda. Destruction of injured trees and prevention of egg-laying by dressing all wounds on the soft parts of the stem with a mixture of tar and clay are the advised methods of treatment.

2. "Scale Insects" (*Aspidiotus Cydoniae* Comst.). All species of palms are very subject to attacks of coccids in Uganda. The species which occurs most widely is *Aspidiotus Cydoniae*, Comst.

The "Congo Floor Maggot" is the larva of *Auchmeromia luteola*, Fab. (Muscidae). The adult fly is harmless, being incapable of blood-sucking.

The maggot, however, feeds on the blood of man, and has been made to feed in captivity on certain other animals. By some authorities it is believed that the maggot lives subcutaneonsly in man, under exceptional cirmustances.

Some amendements to the actual legislation to exclude plant pests are proposed. Directions for killing, preserving and packing insects are appended.

3258 C. B. HARDENBERG. **"San José Scale" in the Transvaal (*Aspidiotus perniciosus*, Comstock** (1). — *The Agricultural Journal of South Africa*, Vol. II, No. 3, pp. 256-263. Pretoria, September 1911.

The presence of this pest was noticed in the Transvaal a few weeks ago. It seems evident that the scale gained entrance into this Province some 6 years ago, on a consignment of 16 000 miscellaneous fruit trees imported from Australia.

Transvaal

(1) Cp. Abstr. 1066 *Bull.* March. 1911; Abstr. 1312 *Bull.* Avril 1911; Abstr. 1967 and 2028 *Bull.* June 1911. See also: *Bull.* No. 62 of the *Bureau of Entomology of the U. S. Dept. of Agr.* (C. L. Marlatt, 1906). (*Ed.*).

The following matters are discussed in the article under review: Introduction and slowness of spread of the scale in the Transvaal, description, life-history, food plants (quoted from *Bultetin N. 12 N.S., U. S. Dept. of Agriculture: Bureau of Entomology*, 1898), distribution, control of the San José scale (natural enemies, fungus diseases, remedial measures).

Among natural enemies the following are mentioned: *Aphelinus fuscipennis*, How.; *A. Mytilaspidis* Le B.; *Aspidiotiphagus citrinus* Craw. and several " ladybirds " (*Coccinellidae*).

The fungus *Sphaerostilbe coccophila* has been reported as keeping the scale greatly in check in Florida (1).

PAUL MARCHAL. **The Omission of Sexual Reproduction in *Chermes Piceae* Retz.** (L'oblitération de la reproduction sexuée chez le *Chermes Piceae* Retz.). — *C. R. de l'Acad. des Sciences*, T. 153, No. 13, pp. 603-604. Paris, 25 Septembre 1911. 3259

In *Chermes Piceae* an entire omission of sexual reproduction has been determined; for on *Abies pectinata* it is exclusively parthenogenetic. At the same time the reproductive stage has not been wholly lost, for occasional winged forms showing the characters of *C. Piceae* appear exceptionally in the spring. France

By keeping in isolation the descendants of a single winged individual found on a fir needle, the writer has this year obtained a good many of the winged form on *Abies pectinata*, and has been able to study their biology. He has found that the winged individuals have no tendency to migrate to spruces to give rise to a sexual generation; many of them, at any rate, can establish themselves on *Abies pectinata*, and produce there parthenogenetic individuals. Thus, these winged individuals are of the type which replace the sexual forms in species which have lost their sexual stage.

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(1) Cp. p. 171 *Bull.* Nov. 1910; Abstr. 341 *Bull.* January 1911; Abstr. 653 *Bull.* February 1911. (*Ed.*).

3260 F. J. CHITTENDEN. **A Note on the Habits of the *Narcissus Fly*** (1). — *Journal of the Royal Horticultural Society*, Vol. XXXVII, Part 1, pp. 122-123. London, October 1911.

In 1910 the "Narcissus Fly" (*Merodon equestris* F.) was scheduled by the Board of Agriculture under the powers conferred upon them by the *Diseases and Pests Act*, and those in whose garden it is found are bound, under a penalty, to report its occurrence to the Board, while certain districts have prohibited the importation of narcissus bulbs unless they are certified to be free from the narcissus fly or to have come from a garden where the fly is unknown.

Great Britain: S. California

Up to the present time it was believed that the "narcissus fly" confined its attacks to bulbs of narcissus; the fly attacks also other plants. Bulbs of *Habrantus pratensis* (2) imported from Holland and bulbs of *Vallota purpurea* and of *Eucharis* imported from Sierra Leone were sent to the writer and were found containing grubs of *Merodon equestris*.

3261 G. F. SCOTT-ELLIOT. **Plant-inhabiting Mites of a Useful Nature.** — (*Transactions and Proceedings of the Botanical Society of Edinburgh*, Vol. XXIV., Part III). — Noticed in *Nature*, Vol. 87, No. 2188, pp. 457. London, 5 October, 1911. (1)

The "red spider (1) and other inimical "mites" (*Acarina*) are well known, but the beneficial "mites", although exceedingly common, have received less attention. Their homes, in the shape of small hollows behind hairs on the undersides of leaves on trees are termed acarodomatia; they are not confined to dicotyledonous trees and shrubs, as was supposed, but are common on tall herbaceous plants and the author has found them on the leaves of "Solomon's Seal" (*Polygonatum biflorum*). With respect to their sphere of usefulness, it is asserted that they feed on scale insects, fungus spores, and other pests. The author suggests that with bacteria they help to prepare organic dust particles for the benefit of plants (3).

Great Britain

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(1) Cp. Abstr. 3054 *Bull.* August-September-October 1911; Abstr. 3271 *Bull.* Nov.-Dec. 1911.

(2) *Habrantus* or *Habracanthus pratensis* are synonyms of *Hippeastrum pratense*. Cf. *Index Kewensis*.

(3) Cp. Abstr. 2366 *Bull.* July 1911. (*Ed.*).

FREDERIC MASKEW. **Care of Ladybirds** (1). — *California Cultivator*, Vol. XXXVIII, No. 13, pp. 290-291. Los Angeles, September 28, 1911. 3262

" In cultivated areas where the native species of ladybirds have been introduced in great quantities, or where they have naturally congregated in large numbers, due to the presence, in abundance, of other insects suited to their food requirements, they are often found hibernating in shocked corn (maize), loose corn stalks, or other debris, in adjacent corn (maize) fields during the winter months. Another favourite rendez-vous for *Hippodamia convergens* in the cultivated valleys of Southern California, is the fields, or rows, of stock beets (mangelwurzel) that have been left growing throughout the winter ". **California**

The writer advises the planting of stock beets along one side of melon fields or the using of bundles or shocks of corn fodder for the purpose of protecting ladybirds, and hold these valuable insects in the immediate neighbourhood of field crops susceptible to the attack of aphids.

PAUL MARCHAL and J. FEYTAUD. **An Egg-Parasite of Cochylis and Eudemis.** (Sur un parasite des oeufs de la Cochylis et de l'Eudémis). — *C. R. de l'Acad. des Sciences*, T. 153, N. 14, pp. 633-636. Paris, 2 Octobre 1911. 3263

During August and September the writers noticed in the departments of Saône-et-Loire, Gironde, and Dordogne, eggs of Cochylis and Eudemis of a blackish colour, looking very different from normal ones. On opening these under the microscope, they found in each a small pupa of a Hymenopterous parasite, lying on its back lengthwise in the egg shell. By keeping some of the eggs under observation they observed the emergence of small winged **France**

(1) " Amongst natural means of protection (against aphids) we have some help from the Aphis-eating birds, but the chief assistance is from the *Coccinellidae*, the beetles well-known as " Ladybirds ", which feed (especially in the larval stage) voraciously on the Aphides ". E. A. ORMEROD: *Manual of Injurious Insects and Methods of Prevention*, p. 125-126. London, 1890.

Cp. Abstr. 1563 *Bull.* May 1911, and Abstr. 1967 *Bull.* June 1911. (*Ed.*).

insects about 0.5 mm. long; these were found to be Chalcids, of the genus *Oophthora*.

The females may pair directly after hatching out, and lose no time in laying in other eggs, after determining by their boring-apparatus that these contain embryos.

The parasites lay in freshly-laid eggs of the moths, as some eggs of Cochylis marked directly they were laid showed the blackening in four or five days.

The parasites do not emerge from the eggs till some time later than the hatching of normal eggs of Cochylis or Eudemis: from eggs already blackened on Aug. 31st. the parasites did not appear till Sept. 9th., whereas healthy eggs collected at the same time and kept under the same conditions hatched on Sept. 5th and 6th. From some other parasitized eggs collected on Sept. 14th the Chalcids did not begin to emerge till Sept. 27th.

The *Oophthora* prefers to lay in Cochylis and Eudemis eggs found close together; indeed, parasitized eggs are hardly ever found singly, but in groups of 4 to 15 or more on one bunch of grapes or on neighbouring bunches.

This Chalcid seems to be *Oophthora semblidis* of Aurivillius. It had not previously been recorded as parasitizing the Microlepidoptera of the Vine; but it was known in the eggs of several other moths. Vassiliew, who calls it *Pentarthron Carpocapsae*, mentions it as laying in eggs of several widespread and destructive Bombycidae: *Malacosoma neustria*, *Euproctis chrysorrhoea*, *Dendrolimus pini*.

This parasite must be considered one of the best checks on its host-species; for by attacking the eggs it destroys them before they have begun to do any damage. Vassiliew observed parthenogenesis in this species; it is also very prolific and has several broods in the year. It is probable that at times when there are no eggs of Cochylis and Eudemis available, they can perpetuate their race in the eggs of many other moths; or even if there is considerable specialization, probably any of the numerous Tortricids found in the country suffice for it. If this be so, the presence of wild or cultivated plants supporting such insects, may favour the propagation of the Chalcid and so tend to check the Cochylis and Eudemis.

H. MAXWELL-LEFROY. **Insecticides. Mixtures and Recipes for Use against Insects in the Field, the Orchard, the Garden and the House** (*Bull. No. 23 the Agricultural Research Institute, Pusa*). — Review by E. ERNEST GREEN in : *The Tropical Agriculturist*, Vol. XXXVII, No. 4, pp. 318-319. Colombo, October 15, 1911. 3264

The author expressly excludes the discussion of insecticides and methods employed against pests of plantation crops, but he describes succinctly the most approved remedies for the common pests of every-day life in the East. The bulletin consists of 22 pages and half as many plates, the latter illustrating various forms and parts of spraying machines. British India

« Insecticides on Field Crops »; « Insecticides in the Garden »; « Soil Insecticides » ; « Insecticides in the House » (treating of Clothes-Moths, Cockroaches, Fish-insects, Fleas and Mosquitoes, etc.) are some of the sectional headings.

The author gives a catalogue of articles, to be purchased locally or made up from easily procurable ingredients, which will meet with nearly every requirement. The list includes:

Lead Chromate, for biting insects on field crops;
Naphtalin Emulsion, for the vegetable garden ;
Crude Oil Emulsion, for sucking insects ;
Book Solution, for the preservation of bindings ;
Pyrethrum Powder, for vermin ;

and such simple ingredients as Rosin, Soda, Phenyl, Arsenic, Citronella Oil, Copper Sulphate, Lime, Borax, Naphtalin and Soap.

Lead Chromate is an insecticide introduced by Mr. Lefroy to take the place of the better known but more dangerous arsenical compounds.

Naphtalin emulsion has been evolved to meet the need for a rapid but volatile insecticide, and is employed more especially for such vegetables as well-formed cabbages or lettuce which will soon be cut. It is described as an insecticide that is extremely effective for a short time and leaves no trace on the plant by next day. The formula for the preparation of emulsion is as follows : Dissolve 6 oz. concentrated size in ½ gallon of hot water, and add 1 lb. soft. soap. Dissolve in 2 gals. of kerosene as much naphtalin as it will absorb ; at ordinary temperatures about 2 lbs. 12 oz. is taken up ; by warming carefully in the open over a small fire, 8 lbs. of naphtalin will dissolve Add the naphtalin solution to the hot size-soap solution, add ½ gallon of water and churn or agitate with a syringe or sprayer.

Crude oil emulsion is employed as the stock contact poison against sucking insects (Scale-bugs, Aphides, etc.).

The author draws attention to the use of deterrents, where the employement of an actual insecticide is impracticable. The object of a deterrent is to render the plant unpalatable. It may be of considerable service in preventing the spread of a localized pest. This principle may be applied to tea cultivation; for instance, where a small area of tea is infested by a swarm of caterpillars, the pest may often be isolated, and the sorrounding bushes protected by spraying the latter with a deterrent, of which the Bordeaux mixture is perhaps the most effective and convenient.

Borax is recommended as an infallible cure for Cockroaches.

3265 BALDANO. **Destruction of Locusts in Argentina** (1). (La destrucción de la langosta. Estudios y observaciones). — *Gaceta Rural*, N. 51, p. 178. Buenos-Ayres, Octubre de 1911.

Señor Baldano, an agricultural-engineer, has presented a monograph on the destruction of locusts to the Argentine Ministry.

Argentina

The destruction of the one known as "Tucura" is more difficult than that of *Schistocerca paranensis*; while the latter prefers bare ground and hard soil, the "Tucura" gets to the bottoms of reeds, onto the roots of plants, and among the leaves of low plants; here it deposits its eggs.

To destroy the eggs vigorous and deep digging over of the soil is all that is required. But the larvae are difficult to deal with, as it is only occasionally, on the mornings following cool nights, that they occur in clusters in the sun. When so found, they may be surrounded with straw and burnt; but this method is not very practicable, as it is not probable that straw will always be to hand where the larvae occur at any given moment. After their second ecdysis, when they assemble among dried plant-remains before getting their wings, is a very favourable time for burning them.

For the first few nights after they are full-grown, they habitually cluster together in large numbers, so that the same method may then be used for destroying them.

(1) See also Abstr. 1578, *Bull.* May 1911. (*Ed.*)

Insects Injurious to Special Crops.

PAUL NOEL. **Rye Enemies** (1). (Les ennemis du Seigle).—*Bulletin du Laboratoire régional d'Entomologie agricole*, 4ème trimestre de 1911 (oct.-nov.-déc.), pp.4-7. Rouen, 1911. **3266**

The writer gives a list of the chief enemies of rye ; they comprise 11 Coleoptera, 1 Hemiptera, 1 Hymenoptera, 11 Lepidoptera, 13 Diptera, 1 Nematode, and 6 cryptogamic diseases. **France**

Sugar-Cane Leaf-Hopper (*Perkinsiella saccharicida*) (2). — *Nature*, Vol. 87, No. 2188, p. 465. London October 5 1911. **3267**

The advent between 1900 and 1902 of the sugar-cane leaf-hopper (*Perkinsiella saccharicida*) into the sugar-cane plantations of Hawaii was the beginning of a great calamity which has befallen sugar-growers in four of those islands: for by February, 1903, the insect had become so numerous as to constitute a serious pest. **Hawai**

(1) See also Abstr. 1908, *Bull.* June 1911. (*Ed.*).

(2) Several historical epidemics of the cane have been due to the *Rhynchota* and of these may be instanced that of the « Cane fly » (*Delphax saccharivora*) in the West Indies, that due to the « pou à poche blanche » (*Icerya séychellarum* and *Pulvinaria iceryi*) in Mauritius, about the middle of the nineteenth century, and that in the Hawaiian Islands due to the « Leaf Hopper » (*Perkinsiella saccharicida*) at the beginning of the twentieth century. To these may be added the more recent epidemic of the « Frog Hopper » (*Tomaspis posticata*), at present (1909) prevalent in Trinidad. (NOEL DEERR, *Cane Sugar*, p. 131. Altrincham (Manchester) 1911. (*Ed.*).

Its spread was greatly facilitated by the fact that in those islands only half the crop is harvested at a time, so that there is a continuous supply of nutriment. Moreover, there was an absence of indigenous enemies, although some native species have since taken to preying on the leaf-hopper. The species was introduced from Queensland; and the loss to planters in Hawaii during 1903 and 1904, from this and other insects, is estimated at three million dollars. *Bulletin No. 93 of the U. S. Bureau of Entomology* is devoted to an account of the life-history of the leaf-hopper and the best means of checking its ravages.

3268 **A New Sugar-Cane Insect.** (Un nouvel insecte de la Canne à sucre). — *La Sucrerie indigène et coloniale*, 47e. An., T. LXXVIII, N. 15, pp. 340-345. Paris, 10 Octobre 1911.

A new insect pest of sugar-cane is reported from Mauritius; it is a beetle, whose larva (*moutouc*) attacks the roots. It appears to be a new species belonging to the family *Scarabacidae*.

Mauritius

A field of young canes of several acres at les Pamplemousses was invaded by the larvae.

The perfect insect remains in the ground by day, and flies at night; it probably feeds on the leaves of various trees and shrubs, particularly "Liberia" coffee. It has not been found damaging sugar-cane leaves.

The female lays her eggs in the soil, preferring such as contains a good deal of humus, as the young larvae feed on this.

The larvae show a decided preference for sugar-cane. They are found 4 to 12 inches deep in the soil, and also under the clumps of cane, which they sometimes attack when they are specially numerous; they occur between the rows when the trash has been dug in. The presence of larvae in holes that had been cleared out several times shows that they can travel from place to place in search of better feeding-grounds. They occur in much smaller numbers in gravelly and rocky soils than in friable soils; this no doubt considerably reduces their sphere of action in the north of the island.

The larva pupates in a cavity in the soil.

The insect has considerable reproductive powers. The extent of the damage done can be readily understood when the number of larvae is considered: in some plant canes four months old an average of ten grubs per hole was found; with 3,000 holes to the arpent this

gives 30,000 grubs per arpent in the holes; between the rows, in hard soil free from trash, the number was 4,300 in an area 400 ft. by 4 ft.; in the remaining soil there were 2,640 in an equal area, giving a total of nearly 37,000 per arpent.

In old ratoons 16 larvae per hole have been found, whilst where there are 50 or 60 in a hole the root system is entirely destroyed.

For treatment, the holes were first cleared of grubs and then filled in with a plough; the whole of the intermediate space was then ploughed over, children following behind to collect the grubs. This cost Rs. 25.78 per arpent; no doubt the expense will be reduced when the methods are better organized.

Insecticides that have been used with success are "durandine", and a mixture of petroleum, soap and creolin; both these killed the larvae in a hour. The expense of these washes might be reduced by importing the chemicals in bulk.

In consideration of the gravity of the malady, the Government has declared infected, or suspected of infection, the whole district of les Pamplemousses where the insect has appeared. An executive committee has also been formed, under the presidency of the Director of Woods and Forests, to carry out the measures proposed for dealing with the pest.

Insects injuring Cowpeas *(Vigna Catjang)* and "Teosinte" *(Euchlaena mexicana)* in Rhodesia. See above Abstr. 3139. **3269**

WALTER W. FROGGATT. **A New Pest of "Salt Bush"** (1): **White Fly (*Aleurodes Atriplex* n. sp.)** — *Agricultural Gazette of New Sonth Wales*, Vol. XXII, Part 9, pp. 757-758. Sydney, September 1911. **3270**

Australia: New South Wales

Specimens of salt-bush were sent to the writer from Broken Hill, N. S. Wales. They were badly infested with a new pest, covering the whole of the underside of nearly every leaf. On exam-

(1) "Saltbushes" are plants recommended for alkali lands, belonging to the family *Chenopodiaceae* and mostly to the genus *Atriplex*. The introduction of the "Australian Saltbush" (*Atriplex semibaccata*) has been a great event in the progress of agriculture in the arid regions. (*Farmers' Bulletin, N. 108, U. S. Dept. Agr.* gives 19 pages of information about "Saltbushes": (L. H. BAILEY, *Cyclopedia of American Horticulture*. London - New York). (*Ed.*).

ination, this proved to be a new species of the family *Aleurodidae*. A number of species beloging to this family are peculiar to Australia, feeding upon native plants, but up to the present none of them has become a serious pest. If the *Aleurodes Atriplex*, however, were to spread over large areas of salt-bush it might do a great deal of damage to this valuable fodder plant, for it would be impossible to treat it by spraying. Therefore it would prabably pay — in the writer's opinion — to isolate and destroy any infested patch of salt-bush.

3271 E. H. JENKINS **"Narcissus Fly" (*Merodon equestris*) attacking *Galtonia candicans*** (1). — *The Gardeners' Chronicle* No. 1,296, Vol. L., p. 310. London, October 28, 1911.

Netherlands

The writer has repeatedly found the larvae of *Merodon equestris* in Dutch cultivated bulbs of *Galtonia candicans*, the earliest instance about 22 years ago. As this pest has been observed attacking a number of bulbous plants, there is every reason for cultivators of bulbous plants of every description to be on the watch for this pest. In the case of the Daffodil, discolouration of the outer tissues of the bulb is a not infrequent indication of the presence of the grub, though it may be as frequently due to the presence of the bulb mite; *Rhizoglyphus echinopus*.

3272 PAUL NOEL. **Diseases of Peas.** (Les ennemies des Pois). — *Bulletin du Laboratoire régional d'Entomologie agricole*, 4eme. trimestre de 1911 (Oct., Nov., Dec.,) pp. 12-14, Rouen, 1911.

France

The writer has drawn up a list of enemies and diseases of peas. It includes 9 Coloeptera, 1 Hemipteron, 1 Hymenopteron, 9 Lepidoptera, 6 Diptera, 1 Acarid, 6 Nematodes, and 5 diseases of cryptogamic origin.

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(1) Cf. Abstr. 3054 *Bull.* August-September-October 1911. (*Ed.*).

MARTIN FLOT. **Destruction of Cochylis and Pyralis by Lamp-Traps** (1). 3273
(Essais de destruction de la Cochylis et de la Pyrale, à Avize, par les pièges lumineux). — *Revue de Viticulture*, 18e. An., T. XXXVI, N. 931, pp. 448-451. Paris, 19 Octobre 1911.

In 1910 the Syndicate of Avize (Marne) used 2 520 acetylene lamps, on an area of 164 hectares (405 acres); this included 31 hectares (75 acres) belonging to the village of Cramant.

The lamps were kept going from July 11th to August 5th; they caught 2 570 402 moths, of which about 1 300 900 (51 %) were females; of this number 59 % were Pyralis and 41 % Cochylis. **France: Marne.**

In 1911 the whole of the territory of Avize and 31 hectares of Cramant were treated. The lamps in use numbered 2 930, requiring 28 men to look after them ; they were lighted from July 6th to August 1st. The catch was 2 028 866 Pyralis and 528 801 Cochylis, a total for these two species of 2 577 667. This gives a slight decrease per hectare on the previous year. Besides these, a good many " noctuelle teintée " moths and hawk-moths were also caught, and in the last few days Cecidomyids (*Cecidomyia œnophila*).

The writer considers that the lighting-power of a lamp or fire should be considered rather than the intensity of the light; 16 to 25 fires per hectare (6 to 10 per acre) should be enough if they are properly managed.

The moths do not fly into the flames and get burnt; but they become dazed by the light and fall into the liquid in the trough and get drowned. It seems that the reflection of the light in the water plays an important part; so the liquid must be clear, and the light as close to the surface of the liquid as possible.

The best catches were generally at lamps at 20 cm. (8 in.) above the ground; but sometimes those at 15 or 10 cm. (6 or 4 ins).) were equally good.

The writer considers acetylene better than electric light.

The expenses in the two seasons averaged 100 fr. per hectare (32*s* per acre). In this figure the cost of the outfit has been spread over three years. Electricity reckoned on the same basis would cost 235 frs. per hectare.

The best nights for catching are those with still air and temperature between 18° and 25° C. (64° to 77° F.) and without a moon.

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(1) See Abstr. 2344 of this *Bull.*, July 1911. (*Ed.*).

3274 **Control of Codlin moth in Australia** (1) — *Insect pests.* (Australia: its Land, Conditions and Prospects. The Observations and experiences of the Scottish Agricultural Commission of 1910-1911). Pp. 303, illustr. (*Insect Pests*, pp. 262-264). Edinburgh and London, W. Blackwood and Sons, 1911.

Australia

The Australian orchardists have their own share of trouble to face as regards both insect and fungus foes. Among the enemies familiar alike to the Australian and the home-grower, the Codlin moth (*Carpocapsa pomonella*) is conspicuous.

The depredations of this pest are known wherever the apple is grown. In Australia it is present in every State, with the doubtful exception of Western Australia. Great precautions have been taken to keep it out of that State and for a number of years no instance of its existence has been recorded.

At the beginning of the present year, however, the press announced that it had been detected in Perth, amongst fruit which had been grown in the State and was being offered for sale.

Very much can be done to keep the pest in check. In all well-managed orchards systematic spraying with arsenate of lead is carried out. The operation is done three or four times, at intervals, commencing immediately after the blossom falls, and before the calyx closes over the eye or apex of the young fruit. Another precaution is to put bandages of cloth round the stems of the trees, to act as traps for the larvae, the bandages being periodically removed and the captured insects killed.

The infested fruit commonly falls prematurely. It should be gathered at once and destroyed. The cocoons are found hidden in the chinks of fruit cases, and it is accordingly very desirable that second-hand cases be not used. The pear and quince are also subject to attack by the moth. As with many other pests, abandoned orchards are an assured means of perpetuating the Codlin moth.

3275 PAUL NOEL. ***Thymalus limbatus*, a possible Pear Pest.** (Le *Thymalus limbatus*). — *Bull. du Laboratoire régional d'Entomologie agricole*, 4ème trimestre de 1911 (Oct., Nov., Déc.), pp. 9-10. Rouen, 1911.

France.

A beetle (*Thymalus limbatus*) is recorded as attacking fruit-trees, particularly pears.

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(1) Cf. Abstr. 1066, *Bull.* March. 1911. (*Ed.*).

MM. Chapuis and Candèze have found the larva of this insect under the bark of wild pears in January; it appears to feed exclusively on wood; it pupates in April. These writers do not consider it injurious.

The larva should, however according to M. Géhin, be considered injurious to pear. Nothing is known of the habits of the perfect insect; it is very rare in Alsace and Normandy.

PAUL NOEL. **The Diseases of the Fig-tree** (1). (Les ennemis du Figuier). — *Bulletin du Laboratoire régional d'Entomologie agricole*, 4ème trimestre de 1911 (Oct., Nov., Déc.), pp. 8-9. Rouen, 1911. **3276**

The fig produces only poor fruits in Normandy. The few enemies which it possesses are given as follows: 3 Coleoptera, 5 Hemiptera, 4 Hymenoptera, 1 Lepidopteron, 2 Acarids, 1 Nematode, and 1 cryptogamic disease. **France**

PAUL NOEL. **Diseases of the Mulberry** (2). (Les ennemis du Mûrier). — *Bulletin du Laboratoire régional d'Entomologie agricole*, 4ème. trimestre de 1911 (Oct., Nov., Déc.), p. 11. Rouen, 1911. **3277**

The enemies of the Mulberry include: 2 Hemiptera, 3 Lepidoptera, 1 Acarid, and 7 cryptogamic diseases. **France**

C. FRENCH, JUNR. **Dried Fruits Beetle** (***Carpophilus hemipterus Steph.***). — *The Journal of the Dept. of Agric. of Victoria*, Vol. IX, Part 9, pp. 640-641. Septembre 1911. **3278**

The "Dried Fruits Beetle" is a native of Europe; thence it has spread throughout the world, and has got a firm hold in Victoria, where it is causing considerable losses to growers and others interested in the dried fruits industry. The insects breed in pantries and other places where dried fruits are kept. **Commonwealth of Australia: Victoria**

(1) See also Abstr. 1595 of this *Bulletin*, May 1911; and Abstr. 1924, June 1911.

(2) See also Abstr. 1027 of this *Bulletin*, March 1911; Abstr. 1297, April 1911; and Abstr. 1596, May 1911.

The eggs are deposited on the dried fruits generally in the spring, and hatch in about a week. The larvae at once commence to feed, ultimately turning into pupae. In this state they remain for about one month, when they emerge as perfect insects. During the time they are at work. they eat part of the fruits, causing some of them to turn black. The fruit is also covered with excreta from the insects and thus rendered unfit for human consumption. Separation of the good from the damaged fruit and fumigation of the stores with hydrocyanic acid gas are advised as remedies. The boxes should be wrapped with strong paper or, better still, placed in large airtight tin boxes. This will prevent attack, especially if the fruits are to be stored for a lengthy period.

A table of 9 figures iilustrates the article.

Legislative and Administrative Measures for the Protection of Plants.

3279 **Infectious Diseases of Plants Law of Jamaica.** (Infectious Diseases in Plants). — *The Journal of the Jamaica Agricultural Society*, Vol. XV, No. 9, pp. 405-406. Kingston, September, 1911.

Jamaica

A copy of the Infectious Diseases of Plants Law 35 of 1911 was published in the above Journal for July. The law has not yet been put in force, as it was necessary to await the appointement of the Inspectors who are given powers to act under it. Many cocoanut growers have been anxious to see this law put in force, and the Savanna-la-Mar Branch has been especially eager to see some practicable work done as the outcome of the law in their district.

The Acting Governor has now appointed Inspectors mentioned in the law as being empowered to carry through its requirements. These Inspectors are the Agricultural Instructors. Our readers should note this particularly, because it means that no man may have diseased cocoanut trees or any other diseased economic trees, such as cocoa, coffee, bananas, etc., standing in his cultivation or his

yard or anywhere he is responsible for, which may spread disease to his neighbours' trees.

Any person having reasonable cause to believe that cocoanut trees or other economic trees growing in neighbouring lands to his are diseased, may give notice in writing to the person in charge of such trees, calling upon him to carry out the treatment of such trees as prescribed by the rules under this law; if no attention is paid to this, the matter should be reported to one of the Instructors who is empowered to enter upon the lands and inspect the plants suspected to be diseased, and who is also empowered to carry out the treatment prescribed, under the law, at the cost of those responsible for the trees. If such diseased trees are beyond redemption, the Inspector can order them to be cut down and burned. If the owner of the trees is not satisfied with the decision of the Agricultural Instructor who has inspected them, he can appeal to the Director of Agriculture, whose decision shall be final.

Of course the Agricultural Instructor need not wait for the matter of diseased trees to be reported to him: if he sees the trees for himself he can act.

J. B. Pole Evans. **Preventing the Introduction of the " Black Scab " or " Wart Disease " of the Potato (*Synchytrium endobioticum*) into the Union of South Africa** (1). (" Black Scab " or " Warty Disease " of the Potato). — *The Agricultural Journal of the Union of South Africa*. Vol. II. No. 3, pp. 338-341. Pretoria, September 1911. 3280

Up to the present " black scab " or " warty disease " (*Synchytrium endobioticum*) has not been detected in South Africa. With a view to preventing its introduction into the Union along with imported " seed " no consignment of potatoes will be passed for admittance into the Union of South Africa unless: (1) the consignee surrenders to the inspector a declaration from the consignor showing the country and local place of origin of the potatoes, giving data that establish the identity of the consignment, and declaring that to the best of his knowledge and belief the fungous disease known as black scab, or wart disease has not been known to occur on the farm or farms where the potatoes concerned were produced; and (2) Union of South Africa

(1) Cf. Abstr. 1007 *Bull.* March 1911. (*Ed.*).

except as herein provided, unless the consignee, if called upon to do so by the inspector, produces an official certificate from the Government Department of Agriculture of the country of origin, in which it is certified at a date not more than 9 months previously that the department, shire, county or other such territorial division in which is situated the place or places declared as being the source or sources where the potatoes were produced. is deemed by the Government to be entirely free of the said disease.

Notwithstanding anything to the contrary in this Regulation (3), consignments of potatoes will be admitted from any country without the official certificate before mentioned, if the Government of the country gives an assurance to the Minister of Agriculture of the Union of South Africa that black scab has not been known to occur in that country. and further undertakes to advise that Minister of any outbreak of such disease. Should an outbreak occur an official certificate as above described will be required.

3281 **Measures to prevent the Introduction of the Mediterranean Fruit-Fly (*Ceratitis capitata*) into the United States.** — See above, Abstr. 3253.

3282 **Government Measures concerning the Destruction of a new Sugar-Cane Insect in Mauritius.** — See above, Abstr. 3268.

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